Sun StorEdge™ 3000 Family FRU Installation Guide

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CHAPTER 1

Sun StorEdge 3000 Family FRUs

This document provides instructions for removing and installing field-replaceable units (FRUs) in Sun StorEdge™ 3120 SCSI arrays, Sun StorEdge 3310 SCSI arrays, Sun StorEdge 3320 SCSI arrays, Sun StorEdge 3510 FC arrays, and Sun StorEdge 3511 SATA arrays.

Note – FRU installation procedures for Sun StorEdge 3510 FC and Sun StorEdge 3511 SATA arrays are identical except where differences are identified in this manual.

Instructions are also included for FRUs which are common to all five arrays. FRU components can be replaced by customers or by Sun service representatives.

This chapter covers the following topics:

- Section 1.1, "Available FRUs" on page 1-2
- Section 1.2, "Static Electricity Precautions" on page 1-8
- Section 1.3, "Power-On Sequence" on page 1-8
- Section 1.4, "Powering Off the Array" on page 1-9

Removal and installation instructions are provided for the following FRUs:

- Disk drives
- Power and fan modules
- Card modules
- Special-Use FRUs, such as batteries

1.1 Available FRUs

Most FRUs are hot-swappable. *Hot-swappable* means that a live upgrade can be performed—the FRU can be removed and replaced while the RAID array is powered on and operational.

Caution – Follow the FRU procedures carefully to ensure successful FRU replacement.

The following tables list the FRUs that are currently available. For additional FRUs and X-options, consult your sales representative or the latest Release Notes for Sun StorEdge 3000 Family products on Sun web sites.

TABLE 1-1 List of Available FRUs for the Sun StorEdge 3120 SCSI Array

FRU Model Number	Description
F370-6195	1U JBOD chassis + I/O board with SAF-TE
F371-0537	1U JBOD chassis + I/O board with SAF-TE, ROHS
F540-6055	Drive module, 36-GB LVD, 15K RPM
F540-6447	Drive module, 36-GB LVD, 15K RPM, ROHS
F540-6056	Drive module, 73-GB LVD, 10K RPM
F540-6448	Drive module, 73-GB LVD, 10K RPM, ROHS
F540-6057	Drive module, 73-GB LVD, 15K RPM
F540-6449	Drive module, 73-GB LVD, 15K RPM, ROHS
F540-6058	Drive module, 146-GB LVD, 10K RPM
F540-6450	Drive module, 146-GB LVD, 10K RPM, ROHS
F540-6494	Drive module, 146-GB LVD, 15K RPM, ROHS
F540-6366	Drive module, 300-GB LVD, 10K RPM
F540-6132	Drive module, 300-GB LVD, 10K RPM, ROHS
F370-6193	AC power supply and fan module, 1U
F371-0536	AC power supply and fan module, 1U, ROHS
F370-6192	DC power supply and fan module, 1U
F371-0535	DC power supply and fan module, 1U, ROHS
F370-5405	Cable, LVD, 1-foot, jumper

TABLE 1-1 List of Available FRUs for the Sun StorEdge 3120 SCSI Array *(Continued)*

FRU Model Number	Description
F371-0303	Cable, LVD, 1-foot, jumper, ROHS
F370-5528	Cable, LVD, 1.5-foot, expansion
F371-0304	Cable, LVD, 1.5-foot, expansion, ROHS
F370-6630	Cable, DC power
F371-0307	Cable, DC power, ROHS
F370-7590	LED and reset switch module, 1U
F371-0538	LED and reset switch module, 1U, ROHS
XTA-3000-AMBSZ	Air management blank sled, ROHS

Caution – You can mix capacity in the same chassis, but not spindle speed revolutions per minute (RPM) on the same SCSI bus. For instance, you can use 36-Gbyte and 73-Gbyte drives with no performance problems if both are 10K RPM drives. Violating this configuration guideline leads to poor performance.

TABLE 1-2 List of Available FRUs for the Sun StorEdge 3310 SCSI Array

FRU Model Number	Description
F370-5393	Box, 2U, JBOD, LVD
F371-0105	Box, 2U, JBOD, LVD, ROHS
F370-5524	Box, 2U, RAID, LVD
F371-0106	Box, 2U, RAID, LVD, ROHS
F370-5394	Event monitoring unit with SAF-TE, 2U
F371-0107	Event monitoring unit with SAF-TE, 2U, ROHS
F370-5396	I/O module, LVD, expansion unit or JBOD, 2U
F370-5397	I/O module, LVD, RAID, 2U
F370-5403	Controller module, LVD, 512 MB memory, battery, 2U
F370-5399	Terminator module, LVD, 2U
F371-0110	Terminator module, LVD, 2U, ROHS
F540-6121	Drive module, 36-GB LVD, 15K RPM
F540-6447	Drive module, 36-GB LVD, 15K RPM, ROHS
F540-5563	Drive module, 73-GB LVD, 10K RPM
F540-6448	Drive module, 73-GB LVD, 10K RPM, ROHS

TABLE 1-2 List of Available FRUs for the Sun StorEdge 3310 SCSI Array *(Continued)*

FRU Model Number	Description
F540-6097	Drive module, 73-GB LVD, 15K RPM
F540-6449	Drive module, 73-GB LVD, 15K RPM, ROHS
F540-5735	Drive module, 146-GB LVD, 10K RPM
F540-6550	Drive module, 146-GB LVD, 10K RPM, ROHS
F540-6494	Drive module, 146-GB LVD, 15K RPM, ROHS
F540-6366	Drive module, 300-GB LVD, 10K RPM
F540-6132	Drive module, 300-GB LVD, 10K RPM, ROHS
F370-6776	AC power and fan module, 2U
F371-0108	AC power and fan module, 2U, ROHS
F370-6798	DC power and fan module, 2U
F371-0109	DC power and fan module, 2U, ROHS
F370-5533	Battery, LVD
F371-0111	Battery, LVD, ROHS
F370-5405	Cable, LVD, 1-foot, jumper
F371-0303	Cable, LVD, 1-foot, jumper, ROHS
F370-5528	Cable, LVD, 1.5-foot, expansion
F371-0304	Cable, LVD, 1.5-foot, expansion, ROHS
F370-6627	Cable, null modem
F371-0305	Cable, null modem, ROHS
F370-6629	Cable, shielded ethernet
F371-0306	Cable, shielded ethernet, ROHS
F370-6630	Cable, DC power
F371-0307	Cable, DC power, ROHS
F370-7589	LED and reset switch module, 2U
F371-0112	LED and reset switch module, 2U, ROHS
XTA-3000-AMBSZ	Air management blank sled, ROHS

TABLE 1-3 List of Available FRUs for the Sun StorEdge 3320 SCSI Array

FRU Model Number	Description
F371-0105	Box, 2U, JBOD, LVD, ROHS
F371-0106	Box, 2U, RAID, LVD, ROHS
F371-0107	Event monitoring unit with SAF-TE, 2U, ROHS
F370-7713	I/O module, expansion unit or JBOD, 2U, ROHS
F370-7655	I/O module, LVD, RAID, 2U, ROHS
F370-7714	Controller module, 512 MB memory, battery, 2U, ROHS
F371-0110	Terminator module, LVD, 2U, ROHS
F540-6447	Drive module, 36-GB LVD, 15K RPM, ROHS
F540-6448	Drive module, 73-GB LVD, 10K RPM, ROHS
F540-6449	Drive module, 73-GB LVD, 15K RPM, ROHS
F540-6450	Drive module, 146-GB LVD, 10K RPM, ROHS
F540-6494	Drive module, 146-GB LVD, 15K RPM, ROHS
F540-6132	Drive module, 300-GB LVD, 10K RPM, ROHS
F371-0108	AC power and fan module, 2U, ROHS
F371-0109	DC power and fan module, 2U, ROHS
F371-0111	Battery, LVD, ROHS
F371-0303	Cable, LVD, 1-foot, jumper, ROHS
F371-0304	Cable, LVD, 1.5-foot, expansion, ROHS
F371-0305	Cable, null modem, ROHS
F371-0306	Cable, shielded ethernet, ROHS
F371-0307	Cable, DC power, ROHS
F371-0112	LED and reset switch module, 2U, ROHS
XTA-3000-AMBSZ	Air management blank sled, ROHS

TABLE 1-4 List of Available FRUs for the Sun StorEdge 3510 FC Array

FRU Model Number	Description
F370-5535	Box, 2U, FC, chassis + midplane (RAID/JBOD)
F371-0531	Box, 2U, FC, chassis + midplane (RAID/JBOD), ROHS
F370-5537	I/O w/SES and RAID controller FC, 1 GB memory, battery, 2U
F371-0532	I/O w/SES and RAID controller FC, 1 GB memory, battery, 2U, ROHS
F370-5538	I/O w/SES, JBOD FC, 2U
F371-0533	I/O w/SES, JBOD FC, 2U, ROHS
F540-5628	Drive module, 36-GB FC, 15K RPM
F540-5629	Drive module, 73-GB FC, 10K RPM
F540-6570	Drive module, 73-GB FC, 10K RPM, ROHS
F540-6098	Drive module, 73-GB FC, 15K RPM
F540-6571	Drive module, 73-GB FC, 15K RPM, ROHS
F540-5626	Drive module, 146-GB FC, 10K RPM
F541-6572	Drive module, 146-GB FC, 10K RPM, ROHS
F370-6776	AC power supply/fan module, FC/SATA, 2U
F371-0108	AC power supply/fan module, SE3000, 2U, ROHS
F370-6798	DC power supply/fan module, FC/SATA, 2U
F371-0109	DC power supply/fan module, SE3000, 2U, ROHS
F370-6799	Battery module, FC/SATA, 2U
F371-0539	Battery module, FC/SATA, 2U, ROHS
F370-5540	Cable, FC, 1.5-foot, expansion
F371-0534	Cable, FC, 1.5-foot, expansion, ROHS
F370-6627	Cable, null modem
F371-0305	Cable, null modem, ROHS
F370-6629	Cable, shielded ethernet
F371-0306	Cable, shielded ethernet, ROHS
F370-6630	Cable, DC power
F371-0307	Cable, DC power, ROHS
F370-7589	LED and reset switch module, 2U
F371-0112	LED and reset switch module, 2U, ROHS

TABLE 1-4 List of Available FRUs for the Sun StorEdge 3510 FC Array *(Continued)*

FRU Model Number	Description
F370-6188	ID switch module, FC
F371-1967	ID switch module, FC, ROHS
XTA-3000-AMBSZ	Air management sled, ROHS
F371-0294	SFP, 4G, SW 850NM, FC, TRANS, ROHS

TABLE 1-5 List of Available FRUs for the Sun StorEdge 3511 SATA Array

FRU Model Number	Description
F370-6775	Box, 2U, SATA, chassis + backplane (RAID/JBOD)
F370-6773	I/O w/SES and RAID controller SATA, 1 GB memory, battery, 2U
F370-6774	I/O w/SES, JBOD SATA, 2U
F540-6180	Drive module, 250-GB SATA, 7200 RPM
F540-6364	Drive module, 400-GB SATA, 7200 RPM
F540-6365	Drive module, 500-GB SATA, 7K, RPM
F370-6776	AC power supply/fan module, FC/SATA, 2U
F371-0108	AC power supply/fan module, SE3000, 2U, ROHS
F370-6798	DC power supply/fan module, FC/SATA, 2U
F371-0109	DC power supply/fan module, SE3000, 2U, ROHS
F370-6799	Battery module, FC/SATA, 2U
F371-0539	Battery module, FC/SATA, 2U, ROHS
F370-5540	Cable, FC, 1.5-foot, expansion
F371-0534	Cable, FC, 1.5-foot, expansion, ROHS
F370-6627	Cable, null modem
F371-0305	Cable, null modem, ROHS
F370-6629	Cable, shielded ethernet
F371-0306	Cable, shielded ethernet, ROHS
F370-6630	Cable, DC power
F371-0307	Cable, DC power, ROHS
F370-7589	LED and reset switch module, 2U
F371-0112	LED and reset switch module, 2U, ROHS

TABLE 1-5 List of Available FRUs for the Sun StorEdge 3511 SATA Array *(Continued)*

FRU Model Number	Description
F370-6188	ID switch module, FC
F371-1967	ID switch module, FC, ROHS
XTA-3000-AMBSZ	Air management sled, ROHS

1.2 Static Electricity Precautions

Perform these steps to prevent damaging the FRUs:

- Remove plastic, vinyl, and foam from the work area.
- Wear an antistatic wrist strap.
- Before handling a FRU, discharge any static electricity by touching a ground surface.
- Do not remove a FRU from its antistatic protective bag until you are ready to install it.
- When removing a FRU from the RAID product, immediately place it in an antistatic bag and in antistatic packaging.
- Handle a FRU only by its edges, and avoid touching the circuitry.
- Do not slide a FRU over any surface.
- Limit body movement (which builds up static electricity) during FRU installation.

1.3 Power-On Sequence

Power on the equipment in the following order so the host computer discovers all connected arrays:

1. **Expansion units**
2. **RAID controllers**
3. **Host computers**

1.4 Powering Off the Array

Most FRU procedures are hot-swappable except for the chassis replacement procedure, the ID switch module replacement procedure, and the LED module replacement procedure. However, you might need to power off the array (both power supplies) if you relocate the array or perform certain maintenance procedures with its associated servers.

Caution – If controllers are not shut down from the firmware application or from the Sun StorEdge Command-Line Interface (CLI) before an array is powered off, data that is written to cache and data that has not been completely written to the disks will be lost.

Before you power off both power supplies, you must perform the following steps, which require shutting down the controller.

1. **Stop all I/O activity to the array.**
2. **Shut down the controller with one of the following commands:**
   - Firmware application "Shutdown Controller" command ("system Functions → Shutdown controller")
   - Sun StorEdge CLI "shutdown controller" command

   These commands first halt all I/O activity, and then write the contents of cache to the drives.
3. **Power off both power supply/fan modules.**

CHAPTER 2

Bezel, Disk Drive, Air Management Sled, and Tabletop Cover FRUs

This chapter provides instructions for removing and installing bezel, ear caps, disk drives, air management sleds, and tabletop cover FRUs, and covers the following topics:

- Section 2.1, "Replacing the Front Bezel and Ear Caps" on page 2-2
  - Section 2.1.1, "Removing the Front Bezel and Ear Caps" on page 2-2
  - Section 2.1.2, "Placing the Bezel and Ear Caps Back Onto the Chassis" on page 2-2
- Section 2.2, "Replacing a Disk Drive" on page 2-4
  - Section 2.2.1, "Identifying the Defective Disk Drive in a RAID Array" on page 2-5
  - Section 2.2.2, "Identifying the Defective Disk Drive in a JBOD Array" on page 2-8
  - Section 2.2.3, "Removing a Defective Disk Drive in a RAID or JBOD Array" on page 2-9
  - Section 2.2.4, "Installing a New Disk Drive in a RAID or JBOD Array" on page 2-10
  - Section 2.2.5, "Scanning the New Drive and Related Procedures for RAID Arrays" on page 2-11
- Section 2.3, "Installing an Air Management Sled" on page 2-15
- Section 2.4, "Adding or Removing the Tabletop Cover" on page 2-16
  - Section 2.4.1, "Converting a Rack-Ready Array to a Tabletop Array" on page 2-17
  - Section 2.4.2, "Converting a Tabletop Array to a Rack-Ready Array" on page 2-19

2.1 Replacing the Front Bezel and Ear Caps

Some procedures require that you remove the front bezel and the small vertical plastic caps on either side of the bezel that cover the rackmount tabs. These rackmount tabs are referred to as “ears.”

2.1.1 Removing the Front Bezel and Ear Caps

1. **Use the provided key to unlock both bezel locks.**
2. **Grasp the front bezel cover on both sides and pull it forward and then down.**

Note – For many operations, including replacing disk drives, it is not necessary to further detach the bezel, because dropping it down moves it sufficiently out of the way.

---

3. **Press the right bezel arm (hinge) toward the left side to release it from the chassis hole.**

   The left hinge also disengages.
4. **Note the location of the chassis bezel holes on each ear.**
5. **Remove the plastic caps from the front left and right ears of the array.**

   Both plastic caps are removed in the same way.

   a. **Squeeze both sides of the cap at the top and the bottom.**

   b. **Turn the cap toward the center of the array until it disengages and pull it free.**

2.1.2 Placing the Bezel and Ear Caps Back Onto the Chassis

Each plastic cap is replaced in the same way, but be sure to place the cap with LED labels on the right ear.

1. **Align the inside round notches of the cap with the round cylindrical posts (ball studs) on the ear.**
2. **Push the top and bottom of the ear cap onto the ear, pressing in on the top side toward the center of the array first.**

3. **Continue pushing the top and bottom of the ear cap onto the ear, pressing on the side toward the outside of the array.**

   Do not use force when placing a cap on an ear.

Caution – Be careful to avoid compressing the reset button under the plastic cap when you replace the plastic cap on the chassis.

4. **Insert the bezel arms into the chassis holes.**
5. **Lift the bezel into position and press it onto the front of the chassis until it is flush with the front.**
6. **Use the key to lock both bezel locks.**

2.2 Replacing a Disk Drive

To replace a disk drive, you first remove the defective disk drive and then install a replacement drive. The drive module is hot-swappable. It is replaced while the RAID product is powered on.

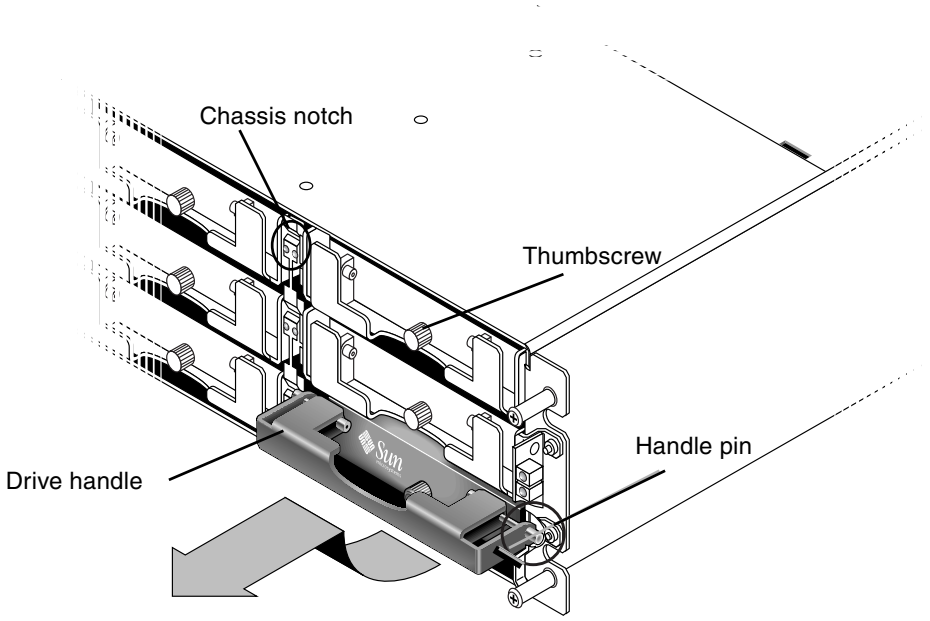

FIGURE 2-1 The Front View of a Drive Module Pulled Out of the Chassis

Caution – When you replace a disk drive, the new disk drive must have the same capacity as or a greater capacity than the disk drive which is being replaced. You can mix capacity in the same chassis, but not spindle speed (RPM) on the same bus. For instance, you can use 36-Gbyte and 73-Gbyte drives with no performance problems if both are 10K-RPM drives. Violating this configuration guideline leads to poor performance.

2.2.1 Identifying the Defective Disk Drive in a RAID Array

Before replacing a disk drive, perform the following steps to ensure that you have identified the correct defective disk for removal in the RAID array.

Note – To receive automatic email notification of a disk drive failure, set up Sun StorEdge Configuration Service or Sun StorEdge Diagnostic Reporter. For details, refer to the *Sun StorEdge 3000 Family Configuration Service User's Guide* or the *Sun StorEdge 3000 Family Diagnostic Reporter User's Guide*. Alternately, you can use the Sun StorEdge Automated Diagnostic Environment (StorADE) application to monitor the status of your array.

Caution – To prevent any possibility of data loss, back up the data prior to removing disk drives.

---

1. **Examine the back of the RAID array and any attached expansion units, and record the cable connections.**
2. **Prepare the RAID product for the disk replacement:**
   a. **From the RAID firmware Main Menu, choose "view and edit Configuration parameters," then choose "Drive-side Parameters."**
   b. **Set the "Periodic Drive Check Time" option to 5 seconds.**
3. **Find the Channel number and target ID combination (for instance, Chl 0 ID 4) of the disk drive to be replaced:**
   a. **From the RAID firmware Main Menu, choose "view and edit Drives."**
   b. **Locate the disk drive that has a status of BAD or FAILED in the Status column:**
      - Write down the Channel number and target ID of the defective disk drive from the Chl and ID columns.
      - Write down the number of the associated logical drive, as shown in the LG_DRV column, that the defective disk drive is a member of.
4. **Physically locate the defective disk drive using the Chl and ID numbers obtained in Step 3.**

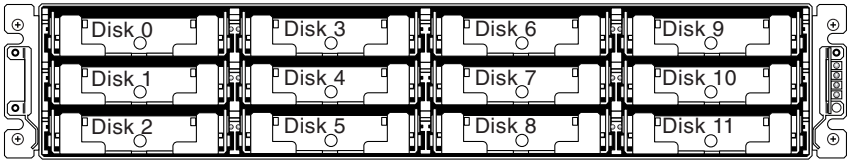

FIGURE 2-2 Front Panel of a RAID Array

Caution – Failure to identify the correct disk drive might result in replacing the wrong disk drive and could cause a loss of data. Be sure that you have identified the correct disk drive. Back up the data prior to removing a disk drive.

5. **If you are uncertain about the location of a drive, check your installation manual for drive ID locations or perform the following steps.**

Note – The following steps only work if there is no I/O activity and the drive is visible to the controller. Under certain fail scenarios, the controller might not be able to detect the failed drive.

   a. **On the RAID firmware Main Menu, choose "view and edit Drives" and press Return.**

   b. **Select the drive you want to identify and press Return.**

   c. **Choose the "Identifying scsi drive" function.**

   d. **Choose "flash all But selected drive" to flash the activity LEDs of all of the drives in the drive channel except the selected drive, and press Return.**

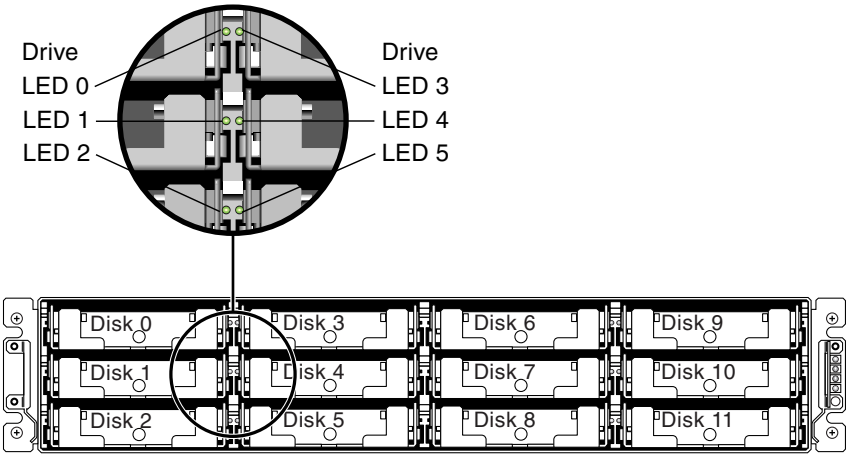

FIGURE 2-3 Front Panel of a RAID Array With LEDs Displayed

e. Type a time interval and press Return.

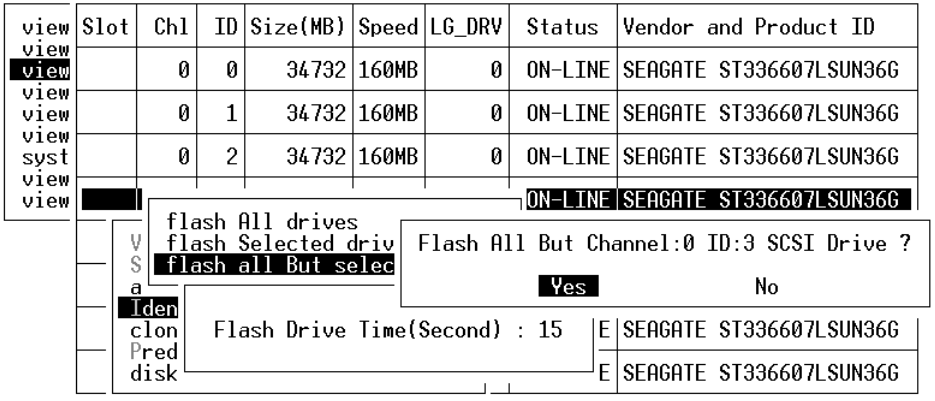

FIGURE 2-4 Identify Drive Option by all Flashing LEDs But the Selected Drive

f. Confirm your choice by choosing Yes and pressing Return.

The read/write LEDs of all drives except the selected drive flash.

2.2.2 Identifying the Defective Disk Drive in a JBOD Array

A JBOD (Just a Bunch of Disks) is an array that consists of drives with no controllers. Before replacing a disk drive in a JBOD, perform the following steps to ensure that you have identified the correct defective disk for removal from the array.

Note – If you are using disk management software or volume management software to manage your disk storage, you might need to perform software operations to take a disk offline before you remove it and after you have replaced a drive to bring it back online. Refer to the documentation that accompanies your disk management software or volume management software for more information.

To receive automatic email notification of a disk drive failure, set up Sun StorEdge Configuration Service or Sun StorEdge Diagnostic Reporter. For details, refer to the *Sun StorEdge 3000 Family Configuration Service User's Guide* or the *Sun StorEdge 3000 Family Diagnostic Reporter User's Guide*. Alternately, you can use the Sun StorEdge Automated Diagnostic Environment (StorADE) application to monitor the status of your array.

Before replacing a disk drive, perform the following steps to ensure that you have identified the correct defective disk for removal.

Caution – To prevent any possibility of data loss, it is strongly recommended that you back up the data prior to removing disk drives.

---

1. **Examine the back of the array, and record the cable connections.**
2. **Physically locate the defective disk drive.**

   A solid amber LED next to a drive on the front panel of the JBOD indicates a failed disk drive. For details, refer to the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array.

Caution – Failure to identify the correct disk drive might result in replacing the wrong disk drive and could cause a loss of data. Be sure that you have identified the correct disk drive. It is strongly recommended that you back up the data prior to removing disks.

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3. **Record the Chl and ID number for the defective disk drive (for example, Chl 0 ID 4).**

   For descriptions of ID settings, refer to the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array.

4. **(Optional) In Sun StorEdge Configuration Service, a red icon in the main window indicates a JBOD drive failure. Review the error log to confirm the disk drive ID for the failed drive.**

   For details on the Sun StorEdge Configuration Service main window, refer to the *Sun StorEdge 3000 Family Configuration Service User's Guide*.

5. **(Optional) In the Sun StorEdge CLI, run the `show enclosure-status` command. If the drive status is Absent the drive might have failed, or has been removed from the chassis.**

   For details on the `show enclosure-status` command, refer to the *Sun StorEdge 3000 Family CLI User's Guide*.

Note – In a split-bus configuration, only the drive status on Ch 0 will be displayed.

2.2.3 Removing a Defective Disk Drive in a RAID or JBOD Array

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Caution – Failure to identify the correct disk drive might result in replacing the wrong disk drive and could cause a loss of data. Be sure that you have identified the correct disk drive.

To prevent any possibility of data loss, back up the data prior to removing disk drives.

Caution – Do not remove a defective module unless you have a replacement FRU module to immediately replace the defective module. If you remove a module and do not replace it, you alter the air flow inside the chassis and could overheat the chassis as a result.

When a failed drive is replaced, the system rebuilds the logical drive by restoring data that was on the failed drive onto a new or spare drive. If you replace more than one drive at a time, the logical drive cannot be rebuilt. If more than one drive fails in a logical drive (except RAID 1+0), the logical drive fails and data from the logical drive is lost.

Remove the defective disk drive with the following steps.

1. **Unlock the locks with the provided key, and gently pull the plastic front bezel away from the front of the unit so that it drops down and is supported by the two hinged brackets on the sides.**

2. **Turn the thumbscrew of the defective disk drive counterclockwise several full turns until the thumbscrew and drive module are loosened.**
3. **Gently pull the release handle upward.**
4. **Pull the drive module out until the drive connector has fully disconnected from the midplane.**
5. **Wait 20 seconds for the drive to stop spinning and then remove it from the chassis.**

2.2.4 Installing a New Disk Drive in a RAID or JBOD Array

To install the replacement disk drive, perform the following steps.

Caution – When you replace a disk drive, the replacement disk drive must have the same capacity as or a greater capacity than the disk drive which is being replaced. You can mix capacity in the same chassis, but not spindle speed (RPM) on the same SCSI bus. For instance, you can use 36-Gbyte and 73-Gbyte drives with no performance problems if both are 10K RPM drives. Violating this configuration guideline leads to poor performance.

Caution – Be sure to install a disk drive that is appropriate for your array. Sun StorEdge 3510 FC array disk drives cannot be used in a Sun StorEdge 3511 SATA array. Similarly, Sun StorEdge 3511 SATA disk drives cannot be used in a Sun StorEdge 3510 FC array.

1. **Gently slide the drive module into the drive slot until the handle pins slip into the chassis notch.**
2. **Lower the disk drive handle until it is vertical.**
3. **Press and hold the drive handle in while you press the thumbscrew in until it engages the threads.**
4. **Turn the thumbscrew clockwise until it is finger-tight.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

5. **Push the plastic front bezel onto the front of the unit until it is seated firmly, and use the key to lock the locks.**

6. **Go to Section 2.2.5, "Scanning the New Drive and Related Procedures for RAID Arrays" on page 2-11.**

Note – If the replaced drive is in a JBOD array directly attached to a server, perform any operations your host software requires to recognize the new drive and bring it under software control.

2.2.5 Scanning the New Drive and Related Procedures for RAID Arrays

When a SCSI array is powered on, the controller scans all physical drives that are connected through drive channels. Unlike FC and SATA arrays, if a SCSI array has completed initialization and then a physical drive is connected, the controller does not recognize the new drive until the next controller reset. This difference in behavior is due to differences between Fibre Channel and SCSI architectures and protocols.

Neither the "Periodic Auto-Detect Failure Drive Swap Check Time" firmware application menu option nor the "Periodic Drive Check Time" menu option force the scanning of a SCSI drive.

2.2.5.1 Scanning the New Drive

After you have replaced a disk drive, perform the following steps.

1. **From the RAID firmware Main Menu, choose "view and edit Drives."**

2. **Check the status of the disk drive.**

   The status field will specify NEW_DRV or USED_DRV until it is assigned as a GLOBAL or LOCAL spare with STAND-BY status.

3. **Scan the replaced disk drive into the configuration with the following steps:**

   a. **From the RAID firmware Main Menu, choose "view and edit Drives." Select any disk drive in the list and press Return.**

   b. **Choose "Scan scsi drive" and press Return. Select the Channel number, then the ID number of the replaced disk drive, and confirm Yes when prompted.**

   c. **Verify that the message "Scanned SCSI drive successfully" is displayed.**

4. **From the RAID firmware Main Menu, choose "view and edit Logical drives" and use the following table to continue.**

TABLE 2-1 Decision Table for Selecting Disk Drive Procedure

If this drive status occurs	Perform this task
If the *target logical drive* status is GOOD, the spare disk has successfully protected it and is now integrated into the logical drive, and the replacement disk drive is available to be assigned.	Go to Section 2.2.5.3, "Assigning a Disk Drive as a Spare" on page 2-13.
If the *target logical drive* status is FATAL FAIL, two or more disk drives have failed	All data in the logical drive is lost. Rebuild the logical drive and restore backup data.
The logical drive status of DRV ABSENT or INCOMPLETE only occurs at chassis power up. DRV ABSENT indicates that one drive is bad. INCOMPLETE indicates that two or more drives are bad.	Go to Section 2.2.5.2, "Checking and Performing the Correct Power-up Sequence" on page 2-12.
If the *target logical drive* status is DRV FAILED	If this occurs after a new drive has replaced the defective drive, it indicates a bad midplane. Replace the chassis.
If the *target logical drive* status is REBUILDING,	Go to Section 2.2.5.4, "If the Logical Drive Status is REBUILDING" on page 2-13.

5. **After replacing a failed drive, save the configuration settings to NVRAM as described in Section 6.2, "Saving the NVRAM Configuration Settings" on page 6-5. The NVRAM procedure applies to all drives.**

   When you save the non-volative RAM (NVRAM) to file, you save the configuration of the array onto each of the hard drives. This step saves the current configuration onto the new hard drive.

2.2.5.2 Checking and Performing the Correct Power-up Sequence

Review the power-up sequence which you most recently used with the RAID array. If you are uncertain about the power-up sequence used, repeat the power-up sequence in the following order and see if it changes the logical drive status to GOOD.

1. **Power up the RAID array and associated server as follows:**
   - Expansion units first
   - RAID array next
   - Host servers last (if they had been powered down for maintenance purposes)
2. **Check the logical drive status in the "view and edit Logical drive" window. If the status is GOOD, no further steps are needed.**

3. **If the logical drive status is FATAL FAIL, two or more disk drives might have failed, data might be lost, and you might have to create a new logical drive.**
4. **If the logical drive status is DRV ABSENT, replace the defective disk drive and assign the replacement drive as a global spare. See Section 2.2.5.3, "Assigning a Disk Drive as a Spare" on page 2-13.**
5. **If the logical drive status is DRV ABSENT and the drive replacement is delayed, try to recover the defective drive so that it is operational during the wait period and you can make a full backup of the data.**
   a. **On the RAID firmware Main Menu, choose "view and edit Configuration parameters" and press Return.**
   b. **Choose "Drive-side Parameters" and press Return.**
   c. **Choose "Disk Access Delay Time" and press Return.**
   d. **Change the value to 60 seconds and press Return.**
   e. **Choose Yes to confirm the setting.**
   f. **Reboot the system.**
   g. **Check the logical drive status in the "view and edit Logical drive" window.**
      - If the status is GOOD, the drive has recovered and the logical drive is no longer in a critical state. The original defective disk drive should work correctly for a time but should still be replaced.
      - If the status is DRV ABSENT or DRV FAILED, replace the drive as soon as possible.
   h. **Back up the logical drive data onto another storage medium.**

2.2.5.3 Assigning a Disk Drive as a Spare

1. **From the RAID firmware Main Menu, choose "view and edit Drives."**
2. **Select the replaced disk drive and press Return (its LG_DRV membership should be NONE or an empty field).**
3. **Choose "Add global spare drive," then choose Yes to confirm when prompted.**

2.2.5.4 If the Logical Drive Status is REBUILDING

The rebuilding process refers to the rebuilding of the logical drive in which the data from a defective disk drive is restored to a global spare.

When you see the REBUILDING status, perform one of the two following procedures.

- Wait until the rebuild process is completed, then replace the defective disk drive. The benefit is that the logical drive is fully restored before you replace the defective drive. This eliminates the possibility of lost data if the wrong drive is removed.

  or

- Replace the defective drive and make the new drive a global spare while the rebuilding process continues.

  This procedure installs the new drive and assigns it as a global spare so that automatic rebuild of a logical drive will occur if a drive fails on any other logical drive.

Note – If a disk drive fails on another logical drive prior to the assignment of a new global spare, you will have to manually rebuild the logical drive.

2.2.5.5 Automatic Rebuild and Automatic Global Spare Assignments After a Failed Drive is Replaced

You can enable one or both of the following firmware features to expedite the rebuilding of a logical drive after a defective drive has been replaced:

- Auto-Assign Global Spare Drive (FC and SATA only): automatically assigns the next unused drive as a global spare so that an automatic rebuild can occur when the next failed drive event occurs)
- Periodic Auto-Detect Failure Drive Swap Check Time: periodically polls the drives, detects when a bad drive has been replaced, and automatically begins the rebuilding logical drive process as soon as the bad drive has been replaced)

Note – These features are Disabled by default. These features require system resources and can impact performance.

Periodic Auto-Detect Failure Drive Swap Check Time

This menu option periodically polls the unit to detect the replacement of a bad drive. If no spare drive is present in the array, the logical drive begins an automatic rebuild of a degraded RAID set when the firmware detects replacement of the bad drive.

The drive swap check time is the interval at which the controller checks to see whether a failed drive has been swapped. When a logical drive's member drive fails, the controller detects the failed drive (at the specified time interval). Once the failed drive has been swapped with a drive that has adequate capacity to rebuild the logical drive, the rebuild begins automatically.

To set the interval for Periodic Auto-Detect Failure Drive Swap Check Time:

1. **Choose "view and edit Configuration parameters → Drive-side Parameters → Periodic Auto-Detect Failure Drive Swap Check Time."**

   A list of intervals is displayed.

2. **Choose an interval.**

   A confirmation message is displayed.

3. **Choose Yes to confirm the setting.**

   When you choose a time value to enable the periodic drive check time, the controller polls all connected drives in the controller's drive channels at the assigned interval. Drive removal is detected even if a host does not attempt to access data on the drive.

Auto-Assign Global Spare Drive (FC and SATA Only)

This feature is Disabled by default. When you enable the "Auto-Assign Global Spare Drive" menu option, the system automatically assigns as a global spare the unused drive with the lowest drive ID. This enables the array to rebuild automatically without user intervention if a drive is replaced.

To enable Auto-Assign Global Spare Drive:

- **Choose "view and edit Configuration parameters → Drive-side Parameters → Auto-Assign Global Spare Drive," and then choose Yes to enable the global spare to be auto-assigned.**

  As soon as a faulty drive is replaced, the replacement drive is identified as a global spare drive.

2.3 Installing an Air Management Sled

An air management sled looks identical to the disk drive module; however, it is an empty box and is used to maintain optimum airflow in a chassis.

If you remove a disk drive and do not replace it, insert an air management sled to maintain the optimum airflow inside the chassis. You can install the air management sled by using the same procedure as Section 2.2.4, "Installing a New Disk Drive in a RAID or JBOD Array" on page 2-10.

2.4 Adding or Removing the Tabletop Cover

You can make a rack-ready array into a tabletop array or make a tabletop array into a rack-ready array. These procedures require attaching or removing a tabletop cover, also known as a tabletop skin, as shown in the following figure.

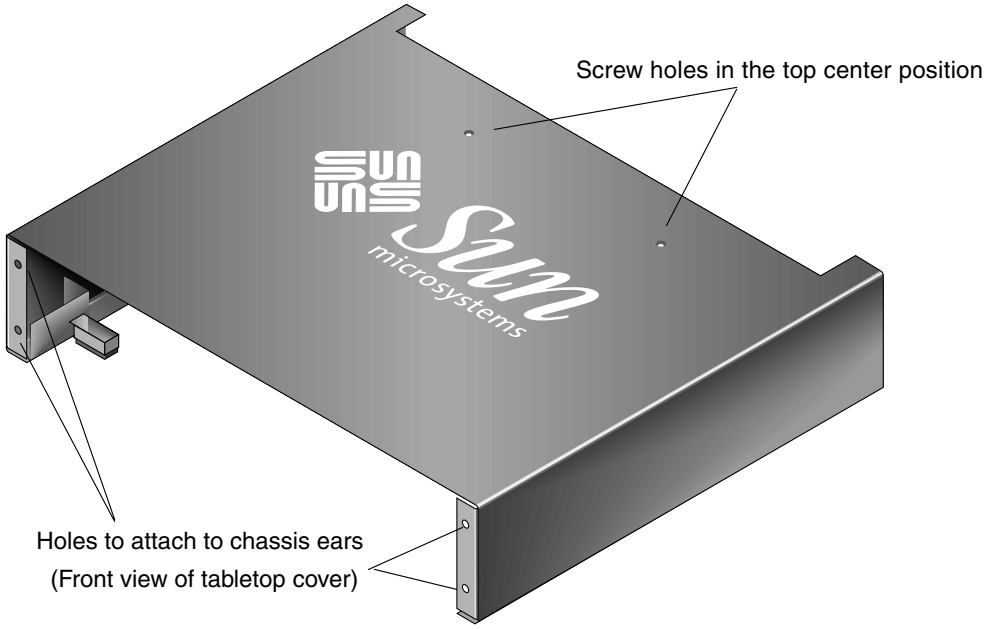


FIGURE 2-5 Tabletop Cover

2.4.1 Converting a Rack-Ready Array to a Tabletop Array

Perform the following steps to convert a rackmounted or rack-ready array to a tabletop array.

1. **If attached, unlock the front bezel cover with the provided key, and pull it forward and downward. Then press the right bezel arm (hinge) towards the left side to release it from the chassis hole.**

   The left hinge will release also. Note the location of the chassis bezel holes on each ear.

2. **Remove the caps from the front left and right ears of the array by squeezing and pressing each cap towards the center of the chassis until it is free.**

3. **If the array is rackmounted, perform the following steps:**

   a. **Remove the screws which attach the front ears to the rack and which attach the array to the back brackets of the rack.**

   b. **Slide the array out of the rack.**

   c. **Remove the screws which attach the side rails to the array and store the rails and related screws.**

4. **On the top of the array, remove the top two back center screws with a Phillips No. 1 screwdriver and discard these screws.**

5. **Slide the back of the array into the front of the tabletop cover until the front of the array is flush with the front of the tabletop cover (see** FIGURE 2-6**).**

Note – As you slide the array into the cover, keep the back of the array tilted slightly upward to avoid bumping the edge of the array on the metal feet of the cover.

---

6. **Loosely attach the front of the tabletop cover to the front ears of the array with two 10-32 x 1/4-inch Phillips panhead screws on each side (see** FIGURE 2-7**).**

7. **Attach the top center back of the tabletop cover to the array with two new black flathead 4-40 x 1/4-inch screws and a Phillips No. 1 screwdriver.**

8. **Tighten the front screws (from Step 6) with a Phillips No. 2 screwdriver.**

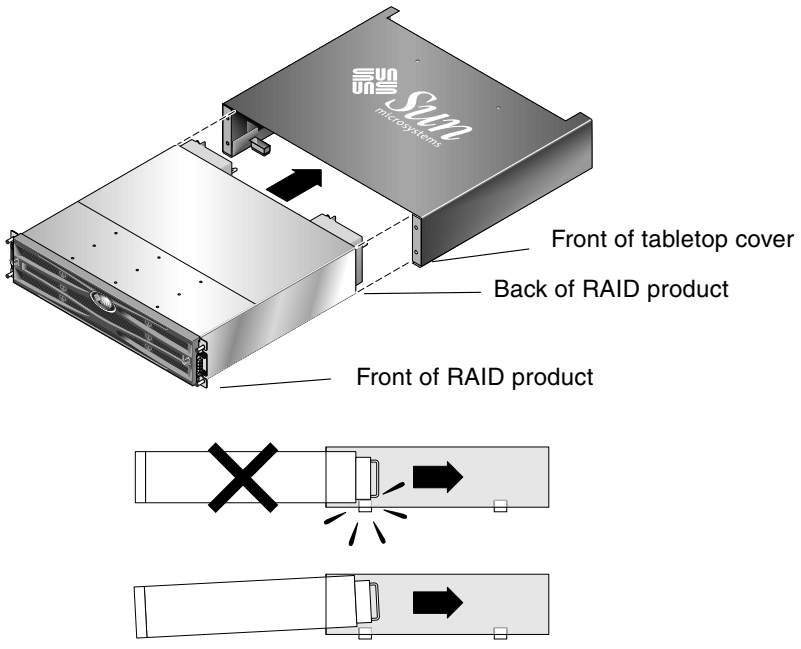


FIGURE 2-6 Sliding the Chassis Into the Tabletop Cover

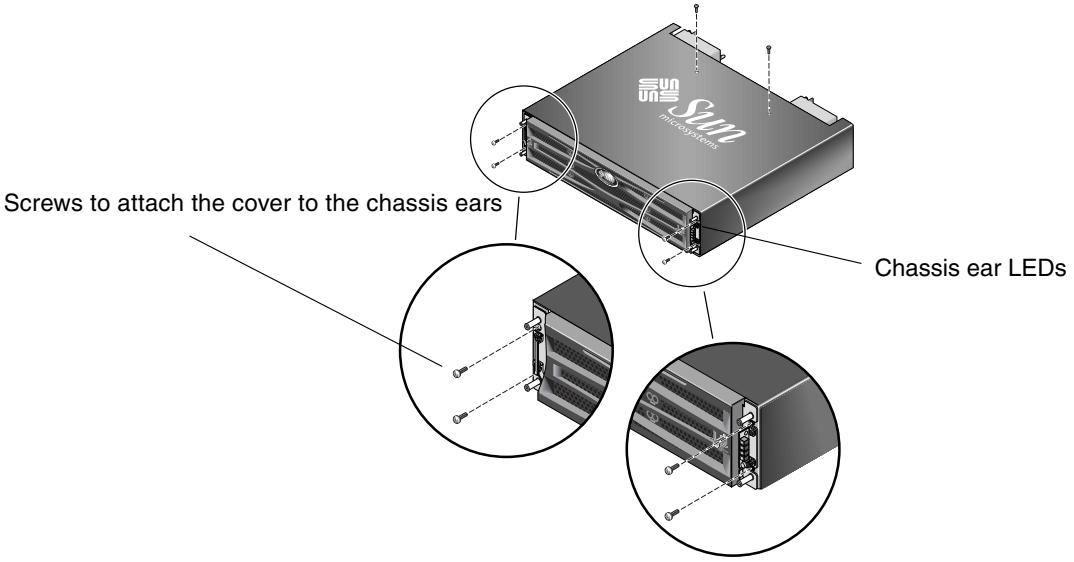


FIGURE 2-7 Attaching the Chassis Ears to the Tabletop Cover

9. **Put the caps back onto the ears:**

   a. **Align the top and bottom edges of each cap with the top and bottom edges of each chassis ear.**

   b. **While holding the side of the chassis with one hand, push the cap onto the ear with the other hand. Be sure to place the cap with LED labels on the right ear.**

Caution – Do not use force when placing a cap on an ear.

10. **Insert the bezel arms into the chassis holes, and then lift and push the bezel onto the front of the chassis and use the key to lock it in place.**

2.4.2 Converting a Tabletop Array to a Rack-Ready Array

Perform the following steps to convert a tabletop array to a rack-ready array.

1. **If attached, remove the bezel front cover by pulling it forward and downward. Then press the right bezel arm (hinge) towards the left side to release it from the chassis hole.**

   The left hinge will release also. Note the location of the chassis bezel holes on each ear.

2. **Remove the caps from the front left and right ears of the array by squeezing and pressing each cap towards the center of the chassis until it is free.**

3. **Remove the 10-32 x 1/4-inch Phillips panhead screws which attach the tabletop cover to the array, with a Phillips No. 2 screwdriver, and discard these screws.**

4. **On the top of the array, remove the top two back center black flathead 4-40 x 1/4-inch screws with a Phillips No. 1 screwdriver and keep these screws.**

5. **Pull the front of the chassis until the chassis is completely removed from the tabletop cover.**

6. **Re-insert and secure the two black screws from Step 4 into the top center back of the rack-ready array using a Phillips No. 1 screwdriver.**

7. **Follow the rack kit installation instructions of the rackmount kit to install the array into a rack. After the RAID product is mounted in the rack, you can re-install the caps onto the ears and the bezel onto the front of the RAID product; these steps are also included in the rack kit instructions.**

CHAPTER 3

Power and Fan Module FRUs

Topics covered in this chapter are:

- Section 3.1, "Replacing Power Supply/Fan Modules for 2U Arrays" on page 3-2
  - Section 3.1.1, "Replacing an AC Power Supply/Fan Module" on page 3-2
  - Section 3.1.2, "Replacing a DC Power Supply/Fan Module" on page 3-3
- Section 3.2, "Replacing Power Supply/Fan Modules for 1U Arrays" on page 3-5
  - Section 3.2.1, "Replacing an AC Power Supply/Fan Module" on page 3-5
  - Section 3.2.2, "Replacing a DC Power Supply/Fan Module" on page 3-6

The following power specifications apply to the power supply and fan modules:

TABLE 3-1 Power Specifications

AC power:	Voltage and frequency 90 to 264 VAC, 47 to 63 Hz
Input current:	1U: 4A max 2U: 5A max
Power-supply output voltages:	+5 VDC and +12 VDC
DC power:	–48V DC (–36 VDC to –72 VDC)

3.1 Replacing Power Supply/Fan Modules for 2U Arrays

3.1.1 Replacing an AC Power Supply/Fan Module

Caution – To avoid damage to equipment, do not remove a power supply/fan module without a working replacement.

3.1.1.1 Removing an AC Power Supply/Fan Module

Be sure to follow Section 1.2, "Static Electricity Precautions" on page 1-8.

1. **Turn off the power, then remove the AC cord locks (if applicable) and the power cable.**
2. **Turn the thumbscrew at the top of the power supply latch counterclockwise until the thumbscrew is disengaged from the power supply.**

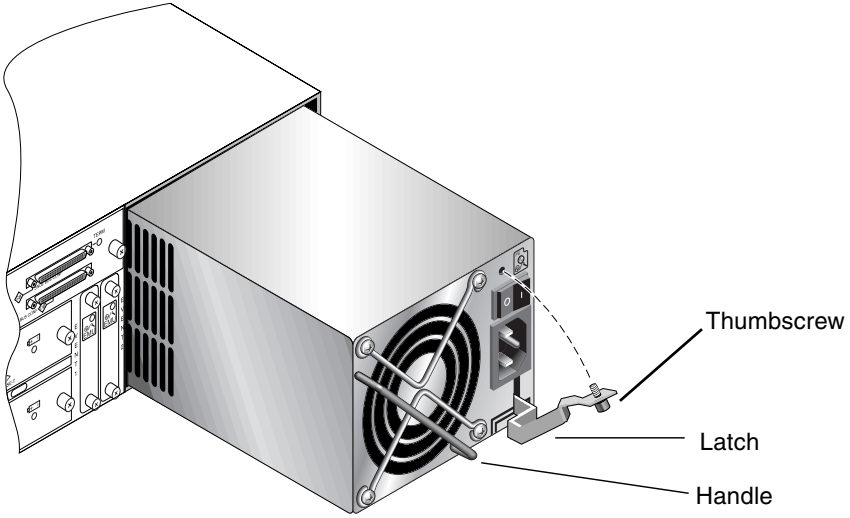


FIGURE 3-1 The Power Supply Partially Pulled out of the Chassis

3. **Pull the latch forward about 45 degrees to disconnect the power supply/fan module from the midplane.**
4. **Use the power supply handle to pull the power supply/fan module out of the chassis.**

3.1.1.2 Installing an AC Power Supply/Fan Module

1. **Slide the new module into the fan and power supply slot.**
2. **Push the latch back so that the power supply is fully inserted into the chassis.**
3. **Turn the thumbscrew at the top of the power supply latch clockwise until it is finger-tight, to secure the module.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

---

4. **Attach the power cable and reinstall the AC cord locks if applicable.**
5. **Turn the power back on.**

3.1.2 Replacing a DC Power Supply/Fan Module

Caution – To avoid damage to equipment, do not remove a power supply/fan module without a working replacement.

3.1.2.1 Removing a DC Power Supply/Fan Module

Be sure to follow Section 1.2, “Static Electricity Precautions” on page 1-8.

1. **Use a flatblade screwdriver to loosen the two screws that secure the power cable to the power supply and then disconnect the cable from the supply.**
2. **Turn the thumbscrew at the top of the power supply latch counterclockwise until the thumbscrew is disengaged from the power supply.**
3. **Pull the latch forward about 45 degrees to disconnect the power supply/fan module from the midplane.**
4. **Use the power supply handle to pull the power supply/fan module out of the chassis.**

3.1.2.2 Installing a DC Power Supply/Fan Module

1. **Slide the new module into the fan and power supply slot.**
2. **Push the latch back so that the power supply is fully inserted into the chassis.**
3. **Turn the thumbscrew at the top of the power supply latch clockwise until it is finger-tight to secure the module.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

---

4. **Connect the DC power cable to the DC source.**

Note – Use only DC power cables provided with the array.

Check the DC cable part number and wire labels carefully before connecting the cable to the source (see the following table.) GND = Chassis Ground.

TABLE 3-2 DC Cable Wiring

Cable 35-00000156 or 35-00000306		
Pin #	**Voltage**	**Color**
A3	L+	White
A2	GND	Green/Yellow
A1	L-	White

5. **Extend the length of the DC power cable as needed, strip the last 1/4-inch of the cable, insert it into a provided Panduit tube, and crimp the tube.**
6. **Attach the power cable to the RAID product.**
7. **Turn the power on.**

3.2 Replacing Power Supply/Fan Modules for 1U Arrays

3.2.1 Replacing an AC Power Supply/Fan Module

Caution – To avoid damage to equipment, do not remove a power supply/fan module without a working replacement.

3.2.1.1 Removing an AC Power Supply/Fan Module

1. **Be sure to follow Section 1.2, "Static Electricity Precautions" on page 1-8.**
2. **Turn off the power, and then remove the AC cord locks (if applicable) and the power cable.**
3. **Turn the thumbscrew at the top of the power supply latch counterclockwise until the thumbscrew is disengaged from the power supply.**

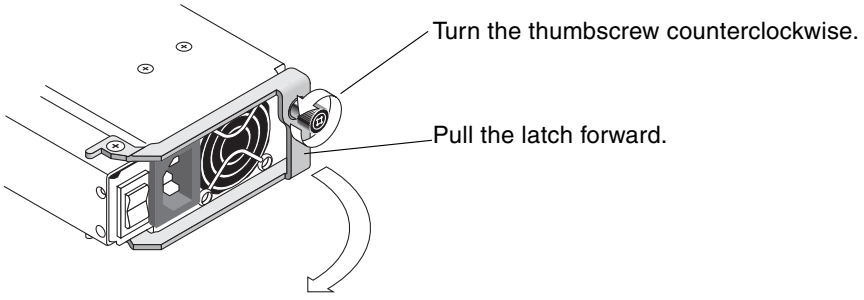


FIGURE 3-2 The Power Supply Partially Pulled out of the Chassis

4. **Pull the latch forward about 90 degrees to disconnect the power supply/fan module from the midplane.**
5. **Pull the power supply/fan module out of the chassis.**

3.2.1.2 Installing an AC Power Supply/Fan Module

1. **Slide the new module into the fan and power supply slot.**
2. **Push the latch back so that the power supply is fully inserted into the chassis.**
3. **Turn the thumbscrew at the top of the power supply latch clockwise until it is finger-tight, to secure the module.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

---

4. **Attach the power cable and reinstall the AC cord locks if applicable.**
5. **Turn the power back on.**

3.2.2 Replacing a DC Power Supply/Fan Module

Caution – To avoid damage to equipment, do not remove a power supply/fan module without a working replacement.

3.2.2.1 Removing a DC Power Supply/Fan Module

1. **Be sure to follow Section 1.2, "Static Electricity Precautions" on page 1-8.**
2. **Turn off the power and remove the power cable.**
3. **Turn the thumbscrew at the top of the power supply latch counterclockwise until the thumbscrew is disengaged from the power supply.**

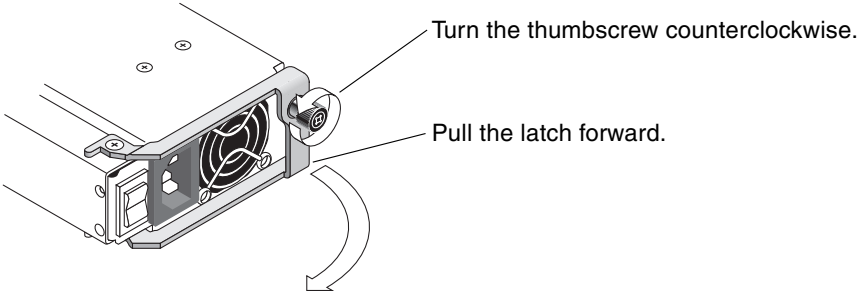


FIGURE 3-3 The Power Supply Partially Pulled out of the Chassis

4. **Pull the latch forward about 90 degrees to disconnect the power supply/fan module from the midplane.**
5. **Pull the power supply/fan module out of the chassis.**

3.2.2.2 Installing a DC Power Supply/Fan Module

1. **Slide the new module into the fan and power supply slot.**
2. **Push the latch back so that the power supply is fully inserted into the chassis.**
3. **Turn the thumbscrew at the top of the power supply latch clockwise until it is finger-tight, to secure the module.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

---

4. **Connect the DC power cable to the DC source.**

Note – Use only DC power cables provided with the array.

Check the DC cable part number and wire labels carefully before connecting the cable to the source (see the following table.) GND = Chassis Ground.

TABLE 3-3 DC Cable Wiring

Cable 35-00000156 or 35-00000306		
Pin #	**Voltage**	**Color**
A3	L+	White
A2	GND	Green/Yellow
A1	L-	White

5. **Extend the length of the DC power cable as needed, strip the last 1/4-inch of the cable, insert it into a provided Panduit tube, and crimp the tube.**
6. **Attach the power cable to the array.**
7. **Turn the power on.**

CHAPTER 4

Battery FRUs

This chapter provides instructions for removing and installing batteries and battery modules. The FC arrays have an independent battery module located above each I/O module. The SCSI arrays contain a battery on each controller module.

The battery dating information is the same for all batteries.

Topics covered in this chapter are:

- Section 4.1, "Battery Operation" on page 4-2
- Section 4.2, "Battery Status on the Initial Firmware Screen" on page 4-2
- Section 4.3, "Battery Dating on the Battery Labels" on page 4-3
- Section 4.4, "Replacing a Battery or Battery Module" on page 4-5
  - Section 4.4.1, "Replacing a SCSI Battery" on page 4-5
  - Section 4.4.2, "Replacing an FC Battery Module" on page 4-9
- Section 4.5, "FC Battery Status and In-Service Date Procedures" on page 4-10
  - Section 4.5.1, "Viewing Status and Setting the In-Service Date With Sun StorEdge CLI" on page 4-11
  - Section 4.5.2, "Viewing Status and Setting the In-Service Date With Sun StorEdge Configuration Service" on page 4-12
  - Section 4.5.3, "Verifying the In-Service Date When Replacing a Battery in Sun StorEdge Configuration Service" on page 4-14
  - Section 4.5.4, "Refreshing the Battery Status With Sun StorEdge Configuration Service" on page 4-16

4.1 Battery Operation

Your lithium ion battery should be changed every two years if the unit is continuously operated at 77°F (25°C). If the unit is continuously operated at 95°F (35°C) or higher, it should be changed every year. The shelf life of the battery is three years.

In the event of a power failure, the battery maintains power to the cache for 72 hours. When power is restored, the data in cache is dumped to disk.

Note – The RAID controller has a temperature sensor which shuts off battery charging above 129°F (54°C). When this happens, the battery status might be reported as BAD, but no alarm is written to the event log since no actual battery failure has occurred. This behavior is normal. As soon as the temperature returns to the normal range, battery charging resumes and the battery status is reported correctly. It is not necessary to replace or otherwise interfere with the battery in this situation.

The battery LED (on the far right side of the controller module) is amber if the battery is bad or missing. The LED blinks green if the battery is charging, and is solid green when the battery is fully charged.

Note – The batteries in controller FRUs experience discharge during shipment and might require an extended charging cycle upon initial power-up. Nominal battery operation is achieved when the battery status LED changes from amber to flashing green within 25 minutes after the initial power cycle. If the battery status LED remains amber for more than 25 minutes after the initial power-up, then the unit must be power cycled to initiate the extended charging cycle. If the battery status LED remains amber for more than 30 minutes after initiating the extended charging cycle, contact Sun service personnel for additional instructions.

4.2 Battery Status on the Initial Firmware Screen

The initial firmware screen displays the battery status at the top where BAT: status displays somewhere in the range from BAD to ----- (charging) or +++++ (fully charged).

For maximum life, lithium ion batteries are not recharged until the charge level is very low, indicated by a status of -----. Automatic recharging at this point takes very little time.

A battery module whose status shows one or more + signs can support cache memory for 72 hours. As long as one or more + signs are displayed, your battery is performing correctly.

TABLE 4-1 Battery Status Indicators

Battery Display	Description
-----	Discharged; the battery is automatically recharged when it reaches this state.
+----	Adequately charged to maintain cache memory for 72 hours or more in case of power loss. Automatic recharging occurs when the battery status drops below this level.
++---	Over 90% charged; adequate to maintain cache memory for 72 hours or more in case of power loss.
+++--	Over 92% charged; adequate to maintain cache memory for 72 hours or more in case of power loss.
++++-	Over 95% charged; adequate to maintain cache memory for 72 hours or more in case of power loss.
+++++	Over 97% charged; adequate to maintain cache memory for 72 hours or more in case of power loss.

4.3 Battery Dating on the Battery Labels

The battery modules display a serial number/part number label, whose placement on the battery is shown in FIGURE 4-1 and FIGURE 4-2.

The serial number bar code is a seven-digit code that indicates the place of manufacture, followed by a dash (–), followed by a four-digit code that indicates the date of manufacture, followed by a supplier-assigned serial number.

In FIGURE 4-1, the example date of battery manufacture is indicated by “0240,” where “02” is the year of manufacture and “40” is the week of manufacture. If a battery does not have a serial number/part number label, the manufacture date for the battery is August 2002. The number below the bottom bar code is the part number (for example, 3705555–04).

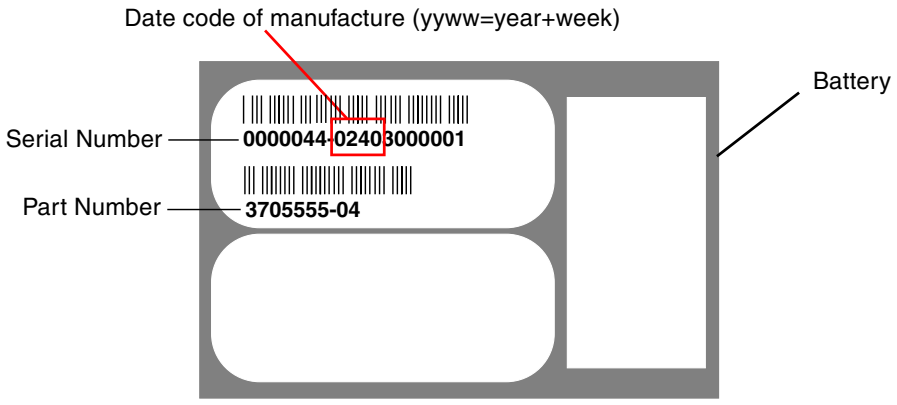


FIGURE 4-1 Battery Label Example for the Sun StorEdge 3310 SCSI Array

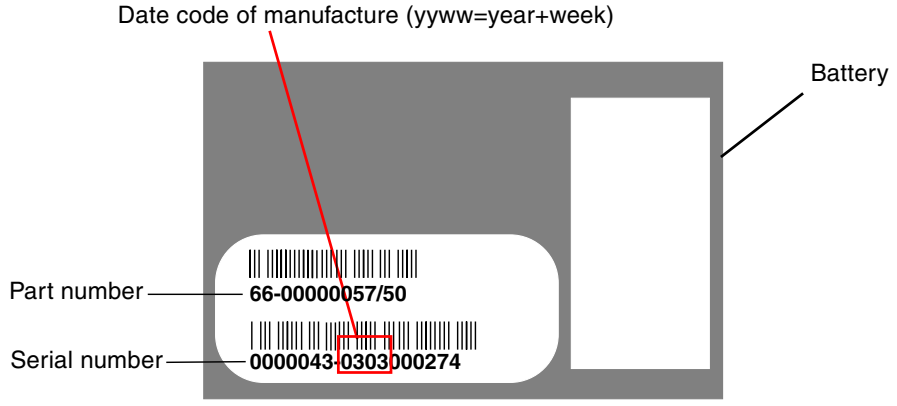


FIGURE 4-2 Battery Label Example for the Sun StorEdge 3510 FC Array

4.4 Replacing a Battery or Battery Module

This section explains how to remove an existing battery or battery module and install a new one. The following procedures are guidelines for replacing battery FRUs in SCSI and FC arrays.

Note – The batteries in controller FRUs experience discharge during shipment and might require an extended charging cycle upon initial power-up. Nominal battery operation is achieved when the battery status LED changes from amber to flashing green within 25 minutes after the initial power cycle. If the battery status LED remains amber for more than 25 minutes after the initial power-up, then the unit must be power cycled to initiate the extended charging cycle. If the battery status LED remains amber for more than 30 minutes after initiating the extended charging cycle, contact Sun service personnel for additional instructions.

4.4.1 Replacing a SCSI Battery

Caution – In a single controller array, you must power off the array before replacing the battery. For instructions on powering off the array, see Section 1.4, "Powering Off the Array" on page 1-9.

Caution – In a dual controller array, if you plan to replace the batteries in both controllers, you must complete all the following steps for the first controller and battery before performing the steps for the second controller; otherwise, the array disconnects and goes offline.

When replacing the battery in a dual controller array, you should first force-fail the controller.

To force-fail a primary controller:

- **From the RAID firmware Main Menu, choose "view and edit Peripheral devices → Set Peripheral Device Entry → Redundant Controller → force Primary controller failure," and then choose Yes to confirm your choice.**

  The primary controller is disabled and the array fails over to the secondary controller.

To force-fail a secondary controller:

1. **From the RAID firmware Main Menu, choose "view and edit Peripheral devices → Set Peripheral Device Entry → Redundant Controller → force Secondary controller failure," and then choose Yes to confirm your choice.**

   A message confirms that the controller has been failed.

2. **Press Escape to clear the message.**

Caution – Use extreme care while removing the controller module. The controller module has many electrostatic discharge (ESD) sensitive components and should be handled using ESD protection. Follow Section 1.2, "Static Electricity Precautions" on page 1-8 for all procedures.

To replace a SCSI array battery, perform the following steps (see FIGURE 4-3 through FIGURE 4-7).

1. **Locate the controller module with the defective or expired battery.**
2. **Turn the thumbscrews on the left and right sides of the controller module that contains the defective or expired battery counterclockwise until the thumbscrews are disengaged from the chassis.**
3. **Use the thumbscrews to pull the controller module completely out of the chassis.**
4. **Disconnect the battery connector from the controller module.**
5. **With a Phillips screwdriver, remove the four battery screws on the underside of the controller module to release the battery from the module.**
6. **Lift out the battery.**
7. **Insert the new battery and attach the battery connector to the controller module.**
8. **With a Phillips screwdriver, attach the battery to the controller with the four screws that you removed in Step 5.**
9. **Reinsert the controller module into the array and turn the thumbscrews on the controller module clockwise until they are finger-tight.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

---

10. **If you force-failed the controller, restore it.**

a. From the RAID firmware Main Menu, choose "view and edit Peripheral devices → Set Peripheral Device Entry → Redundant Controller - Primary" to display the following message.

```
Deassert Reset on Failed Controller ?
```

b. Choose Yes to restore the controller that you previously force-failed.

c. Allow several minutes for the failed controller to come back online.

The following message notifies you when the controller is back online:

```
Controller Default Write Policy Restored
```

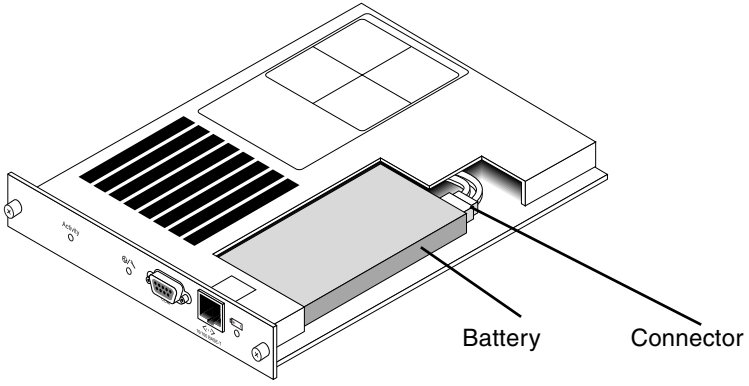


FIGURE 4-3 The Battery and Connector in a SCSI Array

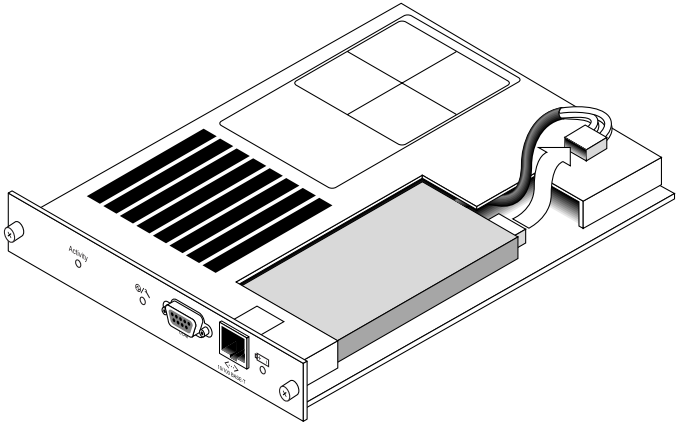


FIGURE 4-4 The Battery Connector Unplugged in a SCSI Array

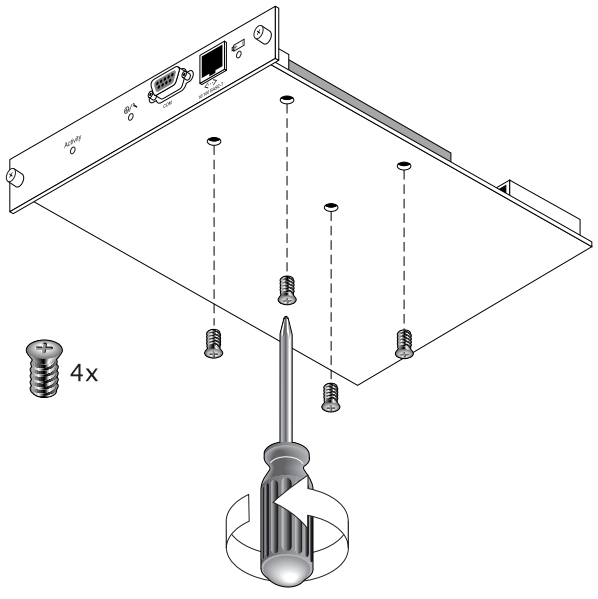


FIGURE 4-5 The Underside of the Battery Module With Screws Being Removed

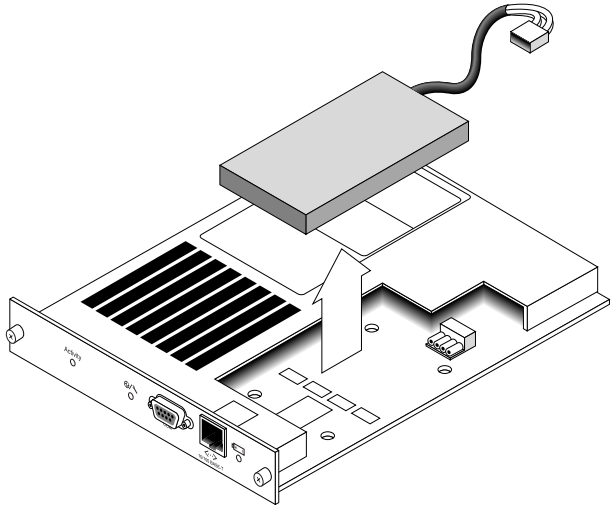


FIGURE 4-6 The Top Side of the Controller Module With the Battery Being Lifted Out and the Connector Unplugged

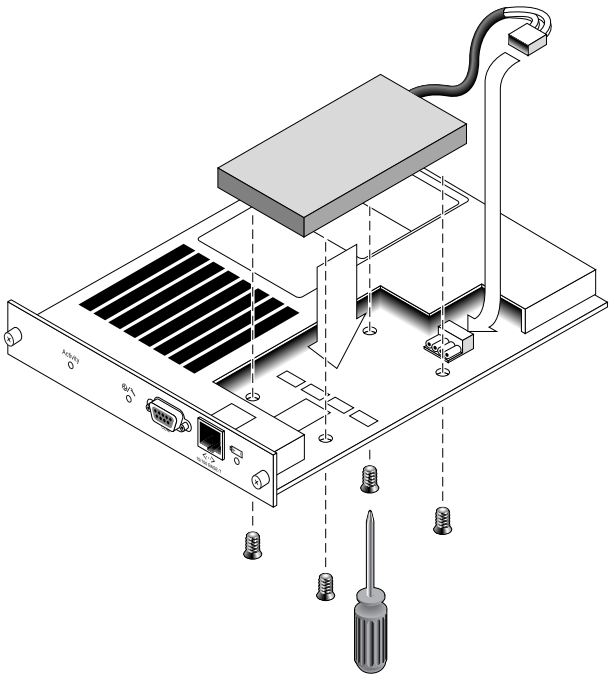


FIGURE 4-7 The Top and Side View of the Controller Module With the Battery Being Inserted

4.4.2 Replacing an FC Battery Module

FC array battery modules are hot-swappable.

Note – Be sure to follow Section 1.2, "Static Electricity Precautions" on page 1-8 for all procedures.

To replace an FC array battery module, perform the following steps.

1. **Locate the battery module with the defective or expired battery.**
2. **Turn the thumbscrews on the left and right sides of the battery module that contains the defective or expired battery counterclockwise until the thumbscrews are disengaged from the chassis.**
3. **Use the thumbscrews to pull the battery module completely out of the chassis.**

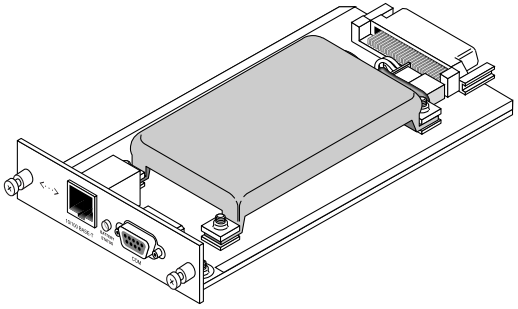


FIGURE 4-8 Battery Module Removed From the Chassis

4. **Insert the new battery module into the array and turn the thumbscrews on the battery module clockwise until they are finger-tight.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

---

5. **Set the in-service dates for the new FC battery replacement with the Sun StorEdge CLI or Sun StorEdge Configuration Service program procedures described under Section 4.5, "FC Battery Status and In-Service Date Procedures" on page 4-10.**

Note – To successfully execute scripts using the Sun StorEdge CLI, the battery in-service date must be set. For details, see Section 4.5, "FC Battery Status and In-Service Date Procedures" on page 4-10.

4.5 FC Battery Status and In-Service Date Procedures

The Sun StorEdge CLI and Sun StorEdge Configuration Service programs offer the following features for FC battery modules:

- Setting the In-Service Date
- Monitoring the FC battery status

Note – If you do not reset and verify the in-service date, Sun StorEdge Configuration Service and the Sun StorEdge CLI cannot accurately calculate the battery expiration date.

4.5.1 Viewing Status and Setting the In-Service Date With Sun StorEdge CLI

The `show battery-status` command displays the status of the battery modules, which preserve the contents of the write cache in each RAID controller. For redundant controllers, status for both batteries is shown. Status values include: Warning, Not present, Bad, N/A, Expired, and OK. A status of Warning indicates that the battery will expire within 21 days.

If you run the `show battery-status` command and the battery in-service date is not set, run the `show battery-status -u` command. Early model battery boards were not programmed with an in-service date. The `show battery-status -u` command sets the in-service date to the battery board manufacturing date and prompts the user to verify the date.

Note – If the battery type is an early board module (FRU ID 370-5545 REVB), then battery expiration monitoring is not supported. In this case, a message displays, "battery board type is not supported." If your configuration requires the battery expiration feature, consult your sales representative to obtain a new battery.

The following example shows one good battery and one expired battery.

```
sccli> show battery-status
 Upper Battery Type: 1
 Upper Battery Manufacturing Date: Fri Oct 17 15:59:08 2003
 Upper Battery Placed In Service:  Fri Oct 17 15:59:08 2003
 Upper Battery Expiration Date:    Sun Oct 16 15:59:08 2005
 Upper Battery Status: OK

 Lower Battery Type: 1
 Lower Battery Manufacturing Date: Fri Oct 17 19:29:20 2003
 Lower Battery Placed In Service:  Fri Oct 17 19:29:20 2003
 Lower Battery Expiration Date:    Sun Oct 6 19:29:20 2004
 Lower Battery Status: Expired
```

The following example uses the -u option, which prompts the user to verify the battery date if the battery in-service date has not been set previously.

```
sccli> show battery-status -u
 Upper Battery Type: 1
 Upper Battery Manufacturing Date: Mon Feb  2 08:00:00 2004
 Upper Battery Placed In Service:  Wed Aug 11 20:18:02 2004
 Upper Battery Expiration Date:    Fri Aug 11 20:18:02 2006
 Upper Battery Status: good

The date 2004/ 9/29 will be stored as the In-Service Date of Lower Battery.
 Are you sure that this date is correct? y

 Lower Battery Type: 1
 Lower Battery Manufacturing Date: Tue Mar 30 14:32:26 2004
 Lower Battery Placed In Service:  Wed Sep 29 21:04:39 2004
 Lower Battery Expiration Date:    Fri Sep 29 21:04:39 2006
 Lower Battery Status: good
```

Note – To successfully execute scripts using the Sun StorEdge CLI, the battery in-service date must be set. Newer battery boards are programmed with the in-service date. If you are not sure that the in-service date is correct, consult your sales representative.

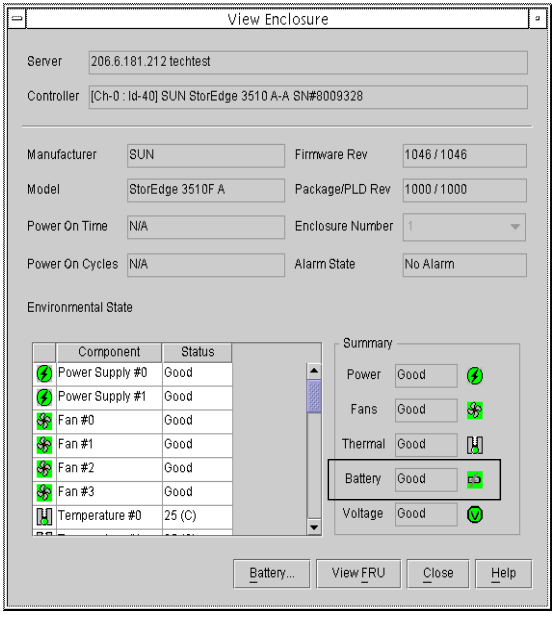
4.5.2 Viewing Status and Setting the In-Service Date With Sun StorEdge Configuration Service

Sun StorEdge Configuration Service monitors the usable life of the FC battery and displays its status in the Battery Information window. The program calculates the battery expiration date using the battery type, manufacture date, and in-service date, which have been programmed at the factory.

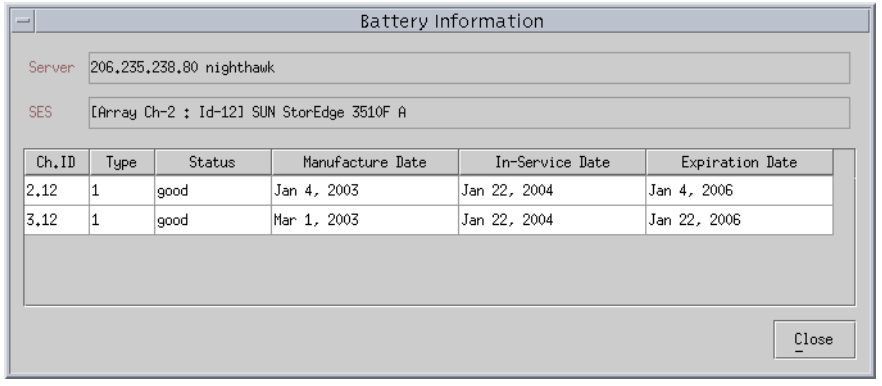
Note – For an FC battery FRU, you must verify the in-service date so that Sun StorEdge Configuration Service can set it as explained in Section 4.5.3, "Verifying the In-Service Date When Replacing a Battery in Sun StorEdge Configuration Service" on page 4-14.

The enclosure icon on the main window displays a degraded (yellow) status 21 days before the battery is going to expire. The enclosure icon also displays a warning (yellow) status if the in-service date has not been set for a battery FRU. A critical (red) status is displayed when a battery has expired.

To view the battery status, choose View → View Enclosure or double-click the enclosure. The View Enclosure window is displayed, showing the battery status in the Summary box.



To view battery information, including type, status, manufacture date, in-service date, and expiration date, click Battery. The Battery Information window is displayed.

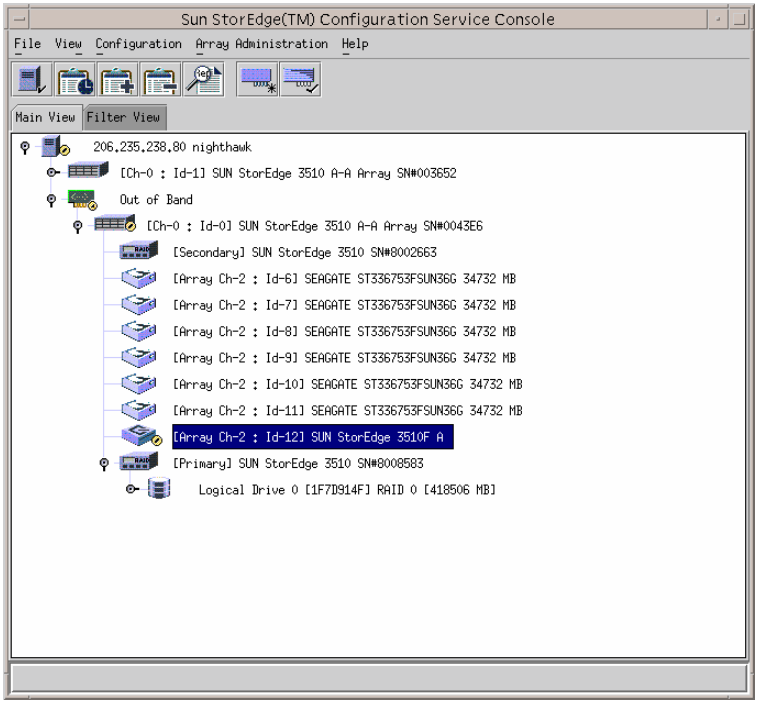


Note – If a battery FRU is replaced and Sun StorEdge Configuration Service does not show the updated battery information, perform a rescan. For details, see Section 4.5.4, "Refreshing the Battery Status With Sun StorEdge Configuration Service" on page 4-16.

4.5.3 Verifying the In-Service Date When Replacing a Battery in Sun StorEdge Configuration Service

When Sun StorEdge Configuration Service detects a battery FRU, the enclosure icon displays a degraded (yellow) status symbol as shown in the following example.

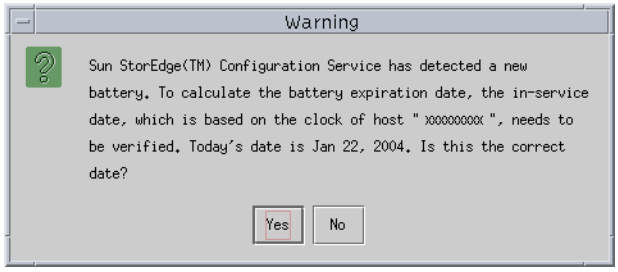
Note – If you do not reset and verify the in-service date, Sun StorEdge Configuration Service cannot accurately calculate the battery expiration date.


Sun StorEdge(TM) Configuration Service Console
File View Configuration Array Administration Help
Main View
Filter View
206.235.238.80 nighthawk
[Ch-0 : Id-1] SUN StorEdge 3510 A-A Array SN#003652
Out of Band
[Ch-0 : Id-0] SUN StorEdge 3510 A-A Array SN#0043E6
[Secondary] SUN StorEdge 3510 SN#8002663
[Array Ch-2 : Id-6] SEAGATE ST336753FSUN36G 34732 MB
[Array Ch-2 : Id-7] SEAGATE ST336753FSUN36G 34732 MB
[Array Ch-2 : Id-8] SEAGATE ST336753FSUN36G 34732 MB
[Array Ch-2 : Id-9] SEAGATE ST336753FSUN36G 34732 MB
[Array Ch-2 : Id-10] SEAGATE ST336753FSUN36G 34732 MB
[Array Ch-2 : Id-11] SEAGATE ST336753FSUN36G 34732 MB
[Array Ch-2 : Id-12] SUN StorEdge 3510F A
[Primary] SUN StorEdge 3510 SN#8008583
Logical Drive 0 [1F7D914F] RAID 0 [418506 MB]

To verify the in-service date, perform the following steps.

1. **Double-click the enclosure icon.**

   Sun StorEdge Configuration Service calculates the battery expiration date using the in-service date (date that the battery is put into service), which is based on the host clock. The program prompts you to verify the date by displaying the following message:


Warning
Sun StorEdge(TM) Configuration Service has detected a new battery. To calculate the battery expiration date, the in-service date, which is based on the clock of host " XXXXXXXX ", needs to be verified. Today's date is Jan 22, 2004. Is this the correct date?
Yes
No

2. **If the host clock is correct, click Yes.**

   The following confirmation message is displayed. Click OK.

   Sun StorEdge Configuration Service sets the in-service date and displays the date in the In-Service Date field in the Battery Information window.

3. **If the host clock is incorrect, click No and reset the clock so that Sun StorEdge Configuration Service can prompt you to verify it again and set the in-service date.**

4.5.4 Refreshing the Battery Status With Sun StorEdge Configuration Service

Sun StorEdge Configuration Service does not automatically detect the status of a battery when it is replaced. To force Sun StorEdge Configuration Service to show the new battery status, you must perform a manual rescan.

To manually scan the battery FRU and view the updated status, perform the following steps.

1. **Double-click the server icon or select the server icon and choose View → View Server.**
2. **Click Rescan.**
3. **Click OK.**

   The server scans the existing server inventory and refreshes the console.
4. **To view the new battery information, double-click the enclosure or select the enclosure and choose View → View Enclosure.**
5. **Click Battery.**

   The Battery Information window displays the updated battery status.

CHAPTER 5

LED Module FRUs

This chapter provides instructions for replacing the LED and reset switch module. For convenience, this module will be called the LED module.

Topics covered in this chapter are:

- Section 5.1, "Replacing the LED Module for 2U Arrays" on page 5-2
  - Section 5.1.1, "Reviewing the Parts and Tools" on page 5-2
  - Section 5.1.2, "Removing the Front Bezel and Right Ear Cap" on page 5-2
  - Section 5.1.3, "Removing the LED Module" on page 5-3
  - Section 5.1.4, "Installing a New LED Module" on page 5-5
  - Section 5.1.5, "Replacing the Ear Cap and Front Bezel" on page 5-7
- Section 5.2, "Replacing the LED Module for 1U Arrays" on page 5-7
  - Section 5.2.1, "Reviewing the Parts and Tools" on page 5-7
  - Section 5.2.2, "Removing the Front Bezel and Right Ear Cap" on page 5-7
  - Section 5.2.3, "Removing the LED Module" on page 5-8
  - Section 5.2.4, "Installing a New LED Module" on page 5-11
  - Section 5.2.5, "Replacing the Ear Cap and Front Bezel" on page 5-12

5.1 Replacing the LED Module for 2U Arrays

5.1.1 Reviewing the Parts and Tools

The following parts are included in the LED module replacement kit:

- one LED/reset switch board, 2U
- two #4-40 x 1/4-inch flathead, magnetic SS, Phillips, 100 degree screws

The following tools are required to complete this procedure:

- Phillips No. 1 screwdriver

5.1.2 Removing the Front Bezel and Right Ear Cap

1. **Power off both RAID controllers.**
2. **If attached, unlock the front bezel cover with the provided key.**
3. **Grasp the front bezel cover on both sides and pull it forward and then down.**
4. **Press the right bezel arm (hinge) toward the left side to release it from the chassis hole.**

   The left bezel arm also disengages.
5. **Note the location of the chassis bezel holes on each ear.**
6. **Remove the plastic cap from the right ear of the array.**

   a. **Squeeze both sides of the cap at the top and the bottom.**

   b. **Turn the cap toward the center of the array until it disengages and pull it free.**

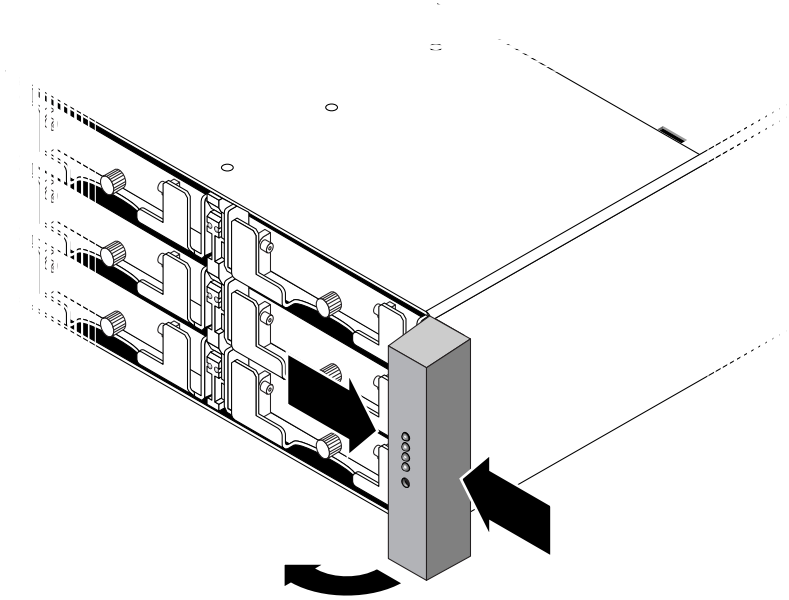


FIGURE 5-1 Removing the Right Ear Cap

5.1.3 Removing the LED Module

Be sure to follow Section 1.2, “Static Electricity Precautions” on page 1-8

1. **Remove the two panhead screws (B in FIGURE 5-2) holding the LED module to the bracket.**

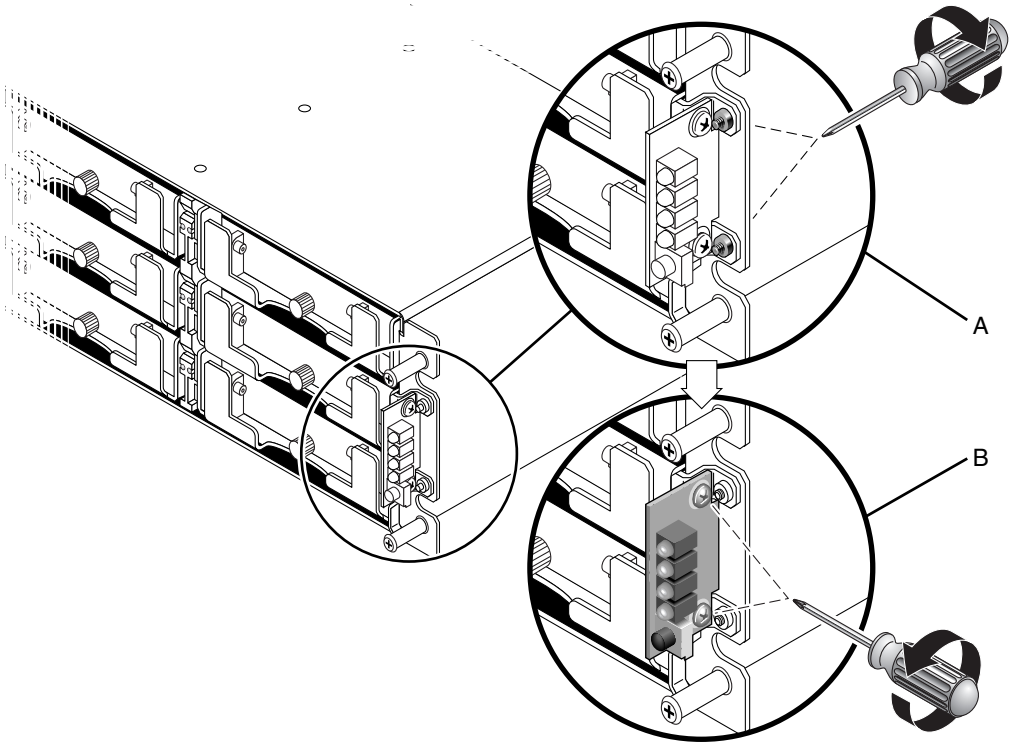


FIGURE 5-2 Detaching the LED Module From the Chassis

Note – If the bracket screws (A in FIGURE 5-2) obstruct the LED module screws (B in FIGURE 5-2), the chassis will have to be removed from the rack (if it is a rackmounted array) or the case (if it is a tabletop array) to gain access to the bracket screws and remove them. Two #4-40 x 1/4-inch flathead screws are provided to replace the bracket screws, should they become damaged when removed. For details on removing the cover from a tabletop array, see Section 2.4, "Adding or Removing the Tabletop Cover" on page 2-16.

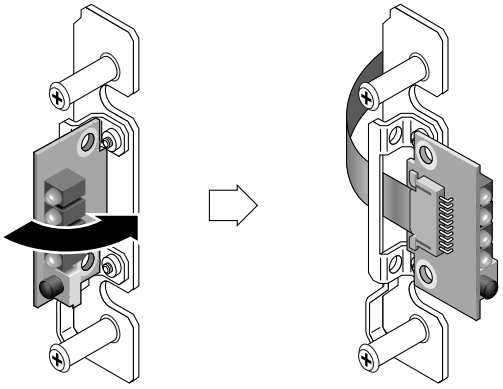


FIGURE 5-3 Removing the LED Module

2. **Carefully detach the LED module from the ribbon cable by pulling out the tiny cable lock drawer and sliding the LED module free.**

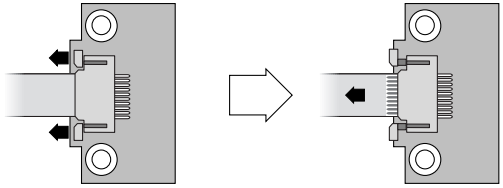


FIGURE 5-4 Disengaging the Ribbon Cable From the Cable Lock Drawer

Caution – Do not pull the ribbon cable too far out from the chassis. If you pull it too far, you might have difficulty sliding it back inside the box or even detach the connection at the other end. If this happens, you will have to remove the top of the chassis and reattach the cable inside.

5.1.4 Installing a New LED Module

Be sure to follow Section 1.2, "Static Electricity Precautions" on page 1-8.

1. **Pull out the cable lock drawer on the new LED module.**
2. **Place the new LED module against the bracket and carefully slide the ribbon cable into the cable lock drawer.**
3. **Close the cable lock drawer to reconnect the cable to the LED module.**

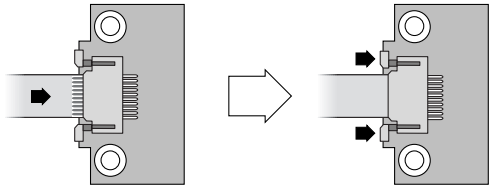


FIGURE 5-5 Inserting the Ribbon Cable Into the Cable Lock Drawer

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Note – The blue side of the ribbon cable must face towards the LED module and the ribbon contact area must be completely inserted into the LED module before the lock drawer is closed.

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4. **Insert the panhead screws through the LED module and attach the LED module to the chassis.**

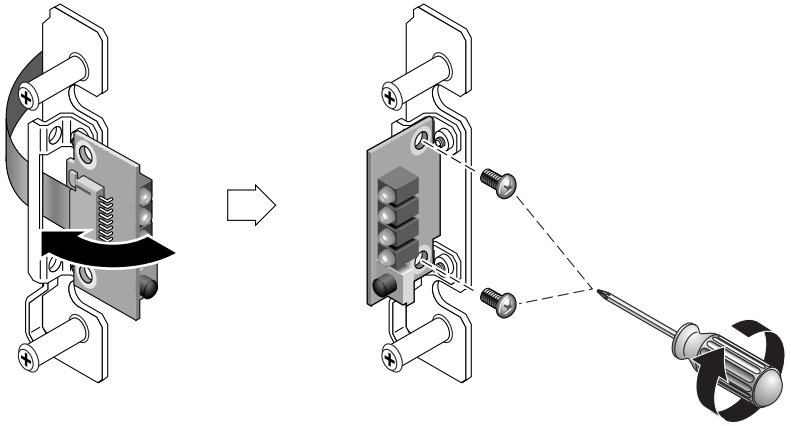


FIGURE 5-6 Installing the New LED Module

5. **If the flathead screws (A in FIGURE 5-2) were removed, reattach these screws through the chassis flange into the bracket.**

   Replacement screws are provided in the ship kit in case the original screws were damaged during removal.

6. **If it was removed in Step 1 in Section 5.1.3, restore the chassis to its case or rack.**

5.1.5 Replacing the Ear Cap and Front Bezel

1. **Push the top and bottom of the ear cap onto the ear, pressing in on the top side toward the center of the array until the ear cap snaps into place.**
2. **Insert the bezel arms into the chassis holes.**
3. **Lift the bezel into position and press it onto the front of the chassis until it is flush with the front.**
4. **Lock the bezel in the closed position with the keys.**
5. **Remove the keys if they were not initially inserted into the chassis.**
6. **Power on both power supply modules.**

5.2 Replacing the LED Module for 1U Arrays

5.2.1 Reviewing the Parts and Tools

The following parts are included in the LED module replacement kit:

- one LED/reset switch board, 1U
- two #4-40 x 1/4-inch flathead, magnetic SS, Phillips, 100 degree screws

The following tools are required to complete this procedure:

- Phillips No. 1 screwdriver
- 3/16” wrench

5.2.2 Removing the Front Bezel and Right Ear Cap

1. **Power off both RAID controllers.**
2. **If attached, unlock the front bezel cover with the provided key.**
3. **Grasp the front bezel cover on both sides and pull it forward and then down.**

4. **Press the right bezel arm (hinge) toward the left side to release it from the chassis hole.**

   The left bezel arm also disengages.

5. **Note the location of the chassis bezel holes on each ear.**

6. **Remove the plastic cap from the right ear of the array.**

   a. **Squeeze both sides of the cap at the top and the bottom.**

   b. **Turn the cap toward the center of the array until it disengages and pull it free.**

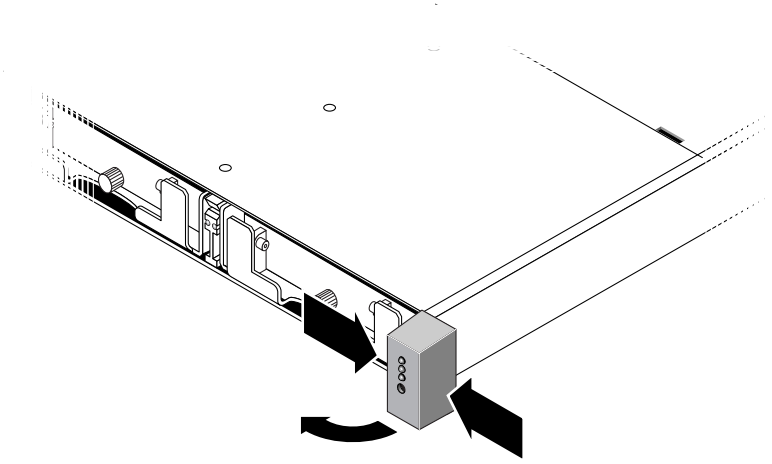


FIGURE 5-7 Removing the Right Ear Cap

5.2.3 Removing the LED Module

Be sure to follow Section 1.2, "Static Electricity Precautions" on page 1-8.

1. **Remove the ball studs holding the LED module to the chassis.**

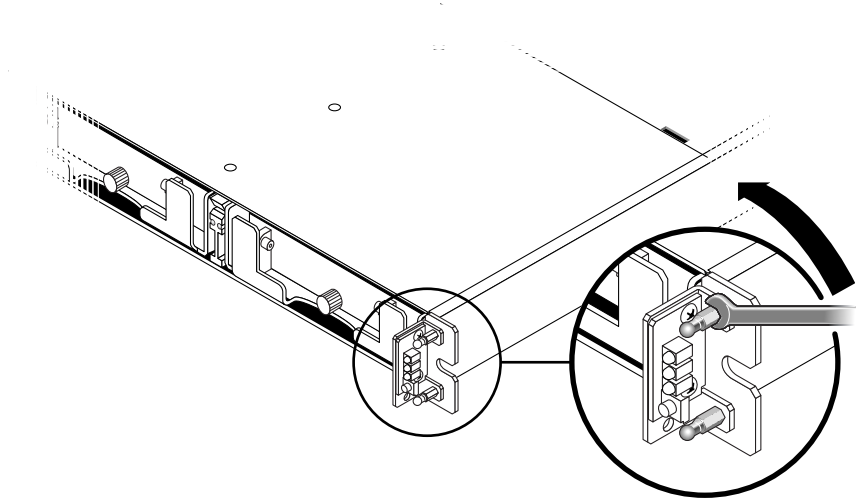


FIGURE 5-8 Removing the ball studs

Note – Older models of the 1U array have two flathead screws driven through from the back side of the bracket. Two #4-40 x 1/4-inch flathead screws are provided to replace the screws, should they become damaged when removed. On newer models, the studs are embedded in the chassis ear and no screws are required. You will need a 3/16″ wrench to remove the ball studs.

Note – If you cannot access the ball studs to remove them, the chassis will have to be removed from the rack.

---

2. **Unfold the ribbon cable and detach it from the LED module by pulling out the tiny cable lock drawer and sliding the LED module free.**

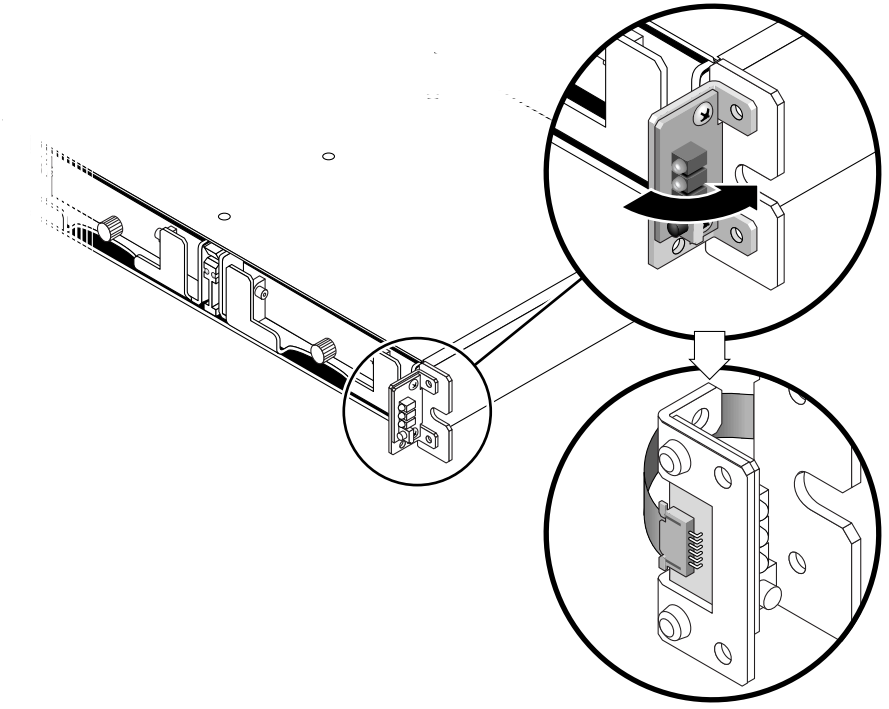


FIGURE 5-9 Removing the LED Module From the Chassis

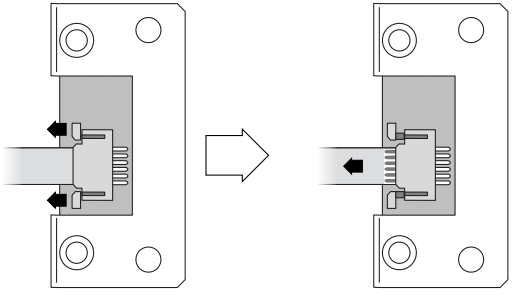


FIGURE 5-10 Detaching the Ribbon Cable From the LED Module

3. **Remove the two panhead screws holding the LED module to the bracket.**

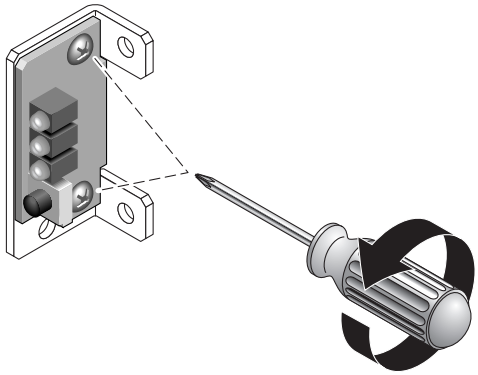


FIGURE 5-11 Removing the Screws Holding the LED Module

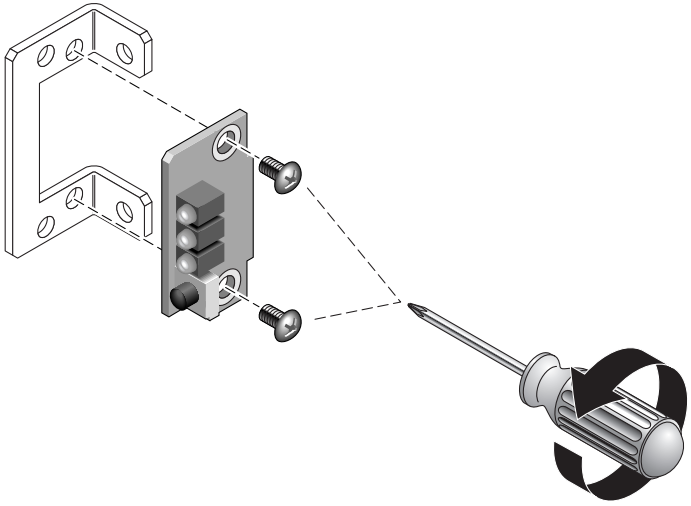


FIGURE 5-12 Detaching the LED Module From the Bracket

5.2.4 Installing a New LED Module

1. **Attach the new LED module to the bracket using the two screws from Step 3 in Section 5.2.3.**
2. **Pull out the cable lock drawer on the new LED module.**
3. **Insert the ribbon cable into the new LED module and close the cable lock drawer to reconnect the cable to the LED module.**

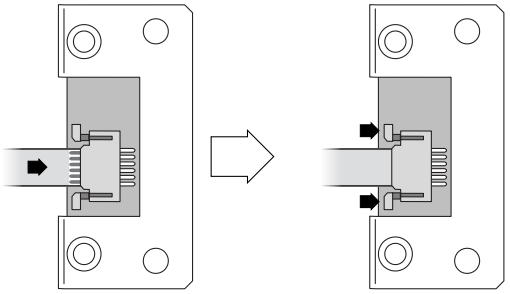


FIGURE 5-13 Inserting the Ribbon Cable Into the Cable Lock Drawer

---

Note – The blue side of the ribbon cable must face towards the LED module and the ribbon contact area must be completely inserted into the LED module before the lock drawer is closed.

---

4. **Fold the ribbon to lay flat against the back of the LED module and attach the LED module to the chassis with the ball studs from Step 1 in Section 5.2.3, "Removing the LED Module" on page 5-8.**

5. **If the ball studs were attached to flathead screws, reattach these screws through the bracket to the ball studs.**

   Replacement screws are provided in the ship kit in case the original screws were damaged during removal.

6. **If it was removed in Step 1 in Section 5.2.3, restore the chassis to its rack.**

5.2.5 Replacing the Ear Cap and Front Bezel

1. **Push the top and bottom of the ear cap onto the ear, pressing in on the top side toward the center of the array until the ear cap snaps into place.**

2. **Insert the bezel arms into the chassis holes.**

3. **Lift the bezel into position and press it onto the front of the chassis until it is flush with the front.**

4. **Lock the bezel in the closed position with the keys.**

5. **Remove the keys if they were not initially inserted into the chassis.**

6. **Power on both power supply modules.**

CHAPTER 6

Sun StorEdge 3510 FC and Sun StorEdge 3511 SATA Controller FRUs

This chapter provides instructions for removing and installing controller module FRUs in Sun StorEdge 3510 FC and Sun StorEdge 3511 SATA arrays.

Topics covered in this chapter are:

- Section 6.1, "Replacing an I/O Controller Module" on page 6-2
- Section 6.2, "Saving the NVRAM Configuration Settings" on page 6-5
- Section 6.3, "I/O Controller Replacement for a Dual-Controller Array" on page 6-5
  - Section 6.3.1, "Removing an I/O Controller Module" on page 6-6
  - Section 6.3.2, "Installing an I/O Controller Module" on page 6-7
  - Section 6.3.3, "Monitoring the Automatic Firmware Update with a Recently Installed Controller FRU" on page 6-9
  - Section 6.3.4, "SES Firmware Update Sometimes Required with I/O Controller Module Replacements" on page 6-10
  - Section 6.3.5, "Restoring the Configuration Settings of a Powered-Off Array" on page 6-11
- Section 6.4, "Converting a Dual-Controller Array to a Single-Controller Array" on page 6-12
- Section 6.5, "Converting a Single-Controller Array to a Dual-Controller Array" on page 6-13
- Section 6.6, "I/O Controller Replacement for a Single-Controller Array" on page 6-15
  - Section 6.6.1, "Downgrading from Controller Firmware Version 4.1x to 3.27" on page 6-19
  - Section 6.6.2, "SES Firmware Update" on page 6-23

6.1 Replacing an I/O Controller Module

Be sure to follow the Section 1.2, “Static Electricity Precautions” on page 1-8.

Note – On Sun StorEdge 3510 FC arrays and Sun StorEdge 3511 SATA arrays, the RAID controller is an integral part of the I/O controller module. To replace an FC or SATA RAID controller, you must replace the entire I/O controller module. For simplicity, the I/O controller module is sometimes referred to as *the controller*.

I/O controller modules are hot-swappable. In the event that it is impossible or impractical to halt I/O from hosts to the array, a controller can be replaced while the surviving controller is active and servicing I/O.

However, if your configuration enables you to halt I/O during the controller replacement procedure without disruption, it is a good idea to do so. With write-back cache enabled under heavy I/O, cache synchronization can take three hours or more to complete. During this time, your controller will display “preparing failback” status and the LED remains amber.

Note – Under firmware version 4.1x, a failed controller forces write-through cache mode by default and is only subject to the 10 minute cross-load time. However, if the default event trigger for a failed controller has been set to DISABLED, cache synchronization could take over three hours. For details regarding write policy and event triggers, refer to the *Sun StorEdge 3000 Family RAID Firmware User’s Guide*.

It is also possible that hardware errors or configuration errors may be present but undetected, resulting in an unserviceable condition that will only be revealed when the hot-swap is underway. For instance, it is possible that a hardware module might be improperly seated.

It is good practice before replacing a controller FRU to try to verify your system's health. Do not replace a working controller on a channel that is offline.

When a controller fails in a dual-controller configuration, the remaining controller automatically becomes the primary controller, if it is not already. If you replace a controller that has not failed, force-fail the controller to be replaced via one of the following methods.

- From the RAID firmware Main Menu:
  - To fail the primary controller, choose "view and edit Peripheral devices → Set Peripheral Device Entry → Redundant Controller – Primary → force Primary controller failure".
  - To fail the secondary controller, choose "view and edit Peripheral devices → Set Peripheral Device Entry → Redundant Controller – Primary → force Secondary controller failure".
- From the CLI:
  - To fail the primary controller, type:

```
sccli> fail primary
```

  - To fail the secondary controller, type:

```
sccli> fail secondary
```

Note – If you are running version 2.0 or greater of the Sun StorEdge CLI, before issuing the `fail` command perform a `show redundancy` command to check the status of the redundant pair. This command will also display the position of the primary controller. Also perform a `show events` command for each controller to view any error messages. The dual-controller array is healthy if the Redundancy mode is Active-Active and the status is Enabled. The single-controller array is healthy if the Redundancy mode is Active-Active and the status is Scanning.

For details on the `fail`, `show redundancy`, and `show events` commands, refer to the *Sun StorEdge 3000 Family CLI User's Guide*.

When a controller is replaced in a **dual-controller configuration**, the controller firmware of the remaining functional controller automatically overwrites the firmware of the new replacement controller to maintain compatibility. This is referred to as *cross-loading*. Cross-loading uses the NVRAM configuration settings to synchronize the firmware version of the newly installed controller to match the firmware version of the running controller.

In a dual-controller configuration, if the controller replacement FRU has a higher SES firmware version than the surviving controller, there will be an SES mismatch with alarms and an amber LED. You must correct the SES mismatch and download the newer SES firmware. For details, see Section 6.3.4, "SES Firmware Update Sometimes Required with I/O Controller Module Replacements" on page 6-10.

Caution – For any firmware upgrade, be sure to follow the upgrade instructions in the patch README file for your array with great care to download and install correctly. If the wrong firmware is installed, or the firmware is installed on the wrong device, your controller might be rendered inoperable. Always be sure to upgrade your SES firmware before trying to determine if you need a PLD upgrade.

In a **single-controller configuration**, you cannot restore the NVRAM configuration settings from disk if you replace a version 3.27 controller with a version 4.1x controller. See Section 6.6, "I/O Controller Replacement for a Single-Controller Array" on page 6-15 for single controller replacement instructions.

Caution – For single-controller FRU replacements, be sure to follow the instructions in Section 6.6, "I/O Controller Replacement for a Single-Controller Array" on page 6-15 and where necessary, downgrade to firmware version 3.27. See Section 6.6.1, "Downgrading from Controller Firmware Version 4.1x to 3.27" on page 6-19 for downgrade instructions.

Note – When a controller is installed and initialized or when configuration settings are changed, you are strongly advised to make a record of the new configuration settings and firmware version. This is particularly important in a single controller configuration for re-establishing your configuration settings when a controller is replaced. You can record this information in the "Record of Settings" appendix in the *Sun StorEdge 3000 Family RAID Firmware User's Guide*.

Note – The batteries in controller FRUs experience discharge during shipment and might require an extended charging cycle upon initial power-up. Nominal battery operation is achieved when the battery status LED changes from amber to flashing green within 25 minutes after the initial power cycle. If the battery status LED remains amber for more than 25 minutes after the initial power-up, then the unit must be power cycled to initiate the extended charging cycle. If the battery status LED remains amber for more than 30 minutes after initiating the extended charging cycle, contact Sun service personnel for additional instructions.

6.2 Saving the NVRAM Configuration Settings

Before replacing a controller, save the NVRAM configuration settings to disk. The saved NVRAM file can be used to restore configuration settings **only if the replacement controller has the same firmware version** as the defective controller.

1. **From the RAID firmware Main Menu, choose "system Functions → controller maintenance → Save nvram to disks."**
2. **Choose Yes to confirm.**

   A message informs you that NVRAM information has been successfully saved.

Caution – Do not restore the 3.27 NVRAM settings from disk onto a 4.1x controller FRU, or vice versa. The NVRAM structures are incompatible.

6.3 I/O Controller Replacement for a Dual-Controller Array

To determine the firmware version of your I/O controller, check the model number. TABLE 6-1 shows the model numbers for FC and SATA I/O controllers.

TABLE 6-1 I/O Controller Model Numbers

I/O Controller	FRU Model Number	X-Option
3.27 FC controller	370-5537-06	595-6578-05
4.11G FC controller *	370-5537-07	595-6578-06
4.11I or later FC controller	370-5537-08 (or higher)	595-6578-07 (or higher)
4.1x FC controller (RoHS)	371-0532-01	594-3339-01
3.27 SATA controller	370-6773-01	595-7419-01
4.11G SATA controller *	370-6773-02	595-7419-02
4.11I or later SATA controller	370-6773-03 (or higher)	595-7419-03 (or higher)

* In a single-controller configuration, the 4.11G firmware must be upgraded to 4.11I or later, or downgraded to 3.27.

It is a recommended practice to always check the SunSolve Download Center located on `http://sunsolve.sun.com` for the latest available firmware upgrades.

If you keep the controller firmware 3.27 version, be sure to upgrade the SES firmware to the latest version in the latest 3.27 patch:

- FC 3.27R patch ID 113723-09 for the Sun StorEdge 3510 FC array
- SATA 3.27R patch ID 113724-03 for the Sun StorEdge 3511 SATA array

To replace a 4.1x I/O controller module with a 3.27 I/O controller module, see Section A.1, "Replacing a 4.1x Controller with a 3.27 Controller (FC and SATA Only)" on page A-2. For all other dual-controller configurations, perform the following steps.

Caution – Cross-loading does not work when you replace a 4.1x I/O controller with a 3.27 I/O controller in a dual-controller chassis. If you replace a 4.1x controller with a 3.27 controller in this configuration without upgrading the 3.27 controller, the replacement controller will not be recognized. See Section A.1, "Replacing a 4.1x Controller with a 3.27 Controller (FC and SATA Only)" on page A-2.

6.3.1 Removing an I/O Controller Module

1. **Keep the array powered on and make sure that the connected hosts are inactive.**

Note – Most users who have multiple host connections between the two controllers use multipathing software to manage them. If multipathing software and connectivity are not possible, one alternative is to power off the array and discontinue all host I/O until the replacement is completed and the array is powered on. See Section 1.4, "Powering Off the Array" on page 1-9 for important instructions about powering off an array.

2. **Write down the cabling configuration for the controller-to-host connections and expansion unit connections so that you can reconnect the cables correctly with the new I/O controller module.**
3. **Remove all cables and SFPs from the I/O controller module.**
4. **Turn the thumbscrews on the left and right sides of the I/O controller module counterclockwise until the thumbscrews are disengaged from the chassis.**
5. **Grasp the handle and carefully pull out the I/O controller module.**

6.3.2 Installing an I/O Controller Module

1. **Keep the array powered on.**

Caution – DO NOT POWER OFF the chassis when you replace a controller module. Multiple problems can occur. If you power off the array and replace a controller module in a dual-controller configuration, the replacement controller could become the primary controller and overwrite any configuration settings previously set. Additionally, if the array is powered off incorrectly, data that is written to cache and that has not been completely written to the disks will be lost.

2. **Gently slide the I/O controller module into the array.**

Caution – Be sure that the module is properly inserted in the guide rails of the array and that you keep the power on. If you power off and then replace the module, you will have to continue with additional steps. See Section 6.3.5, "Restoring the Configuration Settings of a Powered-Off Array" on page 6-11.

   a. **Insert the controller FRU into the slot, and push forward until you begin to feel resistance as the connecting pins engage.**

   b. **Push the controller FRU until the connecting pins are fully seated and the RAID controller fits flush against the back plate of the RAID array.**

      Failure to insert the controller carefully as described above can cause one of the following problems:

      - The surviving controller might reset, causing both controllers to go offline, or the replacement controller might become primary and the surviving controller might become secondary which can cause the controllers to go offline. **Recovery:** Wait until both RAID controllers initialize and come up in redundant mode with no intervention required.
      - If the controller status LED is blinking green on both controllers, then both controllers are primary controllers. **Recovery:** Take out the replacement controller and reinsert it, carefully following the instructions above. If this does not remedy the problem, power-cycle the array.

3. **Turn the thumbscrews on the left and right sides of the I/O controller module clockwise until they are finger-tight, to secure the module and to make the module's front panel flush with the chassis.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

The new controller automatically becomes the secondary controller.

In a redundant-controller configuration where a new controller FRU is installed, the controller status LED will remain amber until the controllers complete the redundant controller process, which can take more than 10 minutes. The same firmware versions must be installed on both controllers for proper redundant-controller operation.

The redundant-controller process automatically cross-loads the firmware version of the newly installed FRU to match the firmware version of the other running controller. For example, if the running controller has firmware 4.13C and the new controller has 4.15, the new controller will be cross-loaded with the 4.13C firmware of the running controller. To monitor this process, see Section 6.3.3, "Monitoring the Automatic Firmware Update with a Recently Installed Controller FRU" on page 6-9.

Caution – Wait a minimum of 10 minutes for the firmware cross-load to be completed. If the newly installed controller is removed for *any* reason during the period when the status LED is amber (for 10 minutes or more), the controller can be rendered inoperable and must be returned for repair.

If you hear an audible alarm after the firmware cross-load and see a blinking amber Event light on the front of your array, the SCSI Enclosure Services (SES) firmware or its associated Programmable Logic Device (PLD) code in the new controller has a version that is different from the code in the other I/O controller in your array. To solve this mismatch, see to Section 6.3.4, "SES Firmware Update Sometimes Required with I/O Controller Module Replacements" on page 6-10.

Note – The beep code that identifies an SES or PLD firmware mismatch is the repeating Morse code letter "R" (dot dash dot).

4. **If you want the most current version of firmware on your controllers, download the latest firmware patch as described in the release notes for your array.**
5. **Reconnect the original cables to the new I/O controller module.**

Caution – You must connect the hosts to the correct host channels on the I/O controller module or your configuration will not work correctly.

6.3.3 Monitoring the Automatic Firmware Update with a Recently Installed Controller FRU

To monitor the status of the automatic firmware update, use the Sun StorEdge CLI `show redundancy-mode` command. The Sun StorEdge CLI will display the progression of “Failed,” “Scanning,” “Detected,” and “Enabled” states.

Note – If you have not installed the Sun StorEdge CLI software, you must install it from the product CD for your array, or from the Sun Download Center website. For details, see the release notes for your array.

- **Initial Failed Status Response:** This is the response to the command upon a controller failure and is shown for completeness.

```
sccli> show redundancy-mode
sccli: selected se3000://210.7.180.17:58632 [SUN StorEdge 3510
SN#0043E6]
 Primary controller serial number: 8008583
 Redundancy mode: Active-Active
 Redundancy status: Failed
 Secondary controller serial number: 8002663
```

- **Scanning Status: Install Controller FRU.** The installed controller is performing self-test and scanning disk channels. This is also the state where the controller will update the firmware on the newly installed controller if not identical to the running firmware version. The controllers can remain in this state for up to 10 minutes depending upon system activity.

```
...
Redundancy status: Scanning
Secondary controller serial number: 0
```

- **Detected Status: Redundant Controller Process Starts.** The installed controller has completed the scanning of the disk channels, updated installed controller firmware as required, and communicated to the primary controller. This status is transitional and normally cannot be detected unless repetitive operations are executed.

```
...
Redundancy status: Detected
Secondary controller serial number: 0
```

- **Enabled State: Redundant Controller Procedure Completed.** The installed controller has completed the redundant controller procedure enabling the active-active operation.

```
...
Redundancy status: Enabled
Secondary controller serial number: 8006511
```

6.3.4 SES Firmware Update Sometimes Required with I/O Controller Module Replacements

Periodically, firmware upgrades are made available as patches that you can download from SunSolve™ Online, located at:

http://sunsolve.sun.com

Sun StorEdge 3510 FC and Sun StorEdge 3511 SATA array patches contain the most current version of the controller, SES, and PLD firmware.

SunSolve has extensive search capabilities that can help you find the appropriate patch, as well as regular patch reports and alerts to let you know when firmware upgrades and related patches become available. In addition, SunSolve provides reports about bugs that have been fixed in patch updates.

Each patch includes an associated README text file that provides detailed instructions about how to download and install that patch. But, generally speaking, all firmware downloads follow the same steps:

- Locating the patch on SunSolve that contains the firmware upgrade you want.
- Downloading the patch to a location on your network.
- Using your array software (Sun StorEdge CLI) to download the firmware to the device it updates.

Refer to the release notes for your array for the latest patch available for your array at the time of release.

If you hear an audible alarm after replacing a controller module and see a blinking amber Event light on the front of the array/unit, the new I/O expansion module or controller module has a different version of SES firmware or PLD firmware than that of the other I/O module in the array/unit. To resolve this mismatch you must download new SES firmware. This can be done using the Sun StorEdge CLI for your array.

If you have not installed the Sun StorEdge CLI software, you must install it from the product CD for your array, or from the Sun Download Center website. For details, see the release notes for your array.

Use the Sun StorEdge CLI commands `show ses-devices` and `show events` to see what error condition is causing the alarms. If the error message indicates a PLD firmware mismatch, it might be because your SES firmware has not yet been upgraded. Upgrading your SES firmware usually resolves any apparent PLD mismatch.

Refer to the *Sun StorEdge 3000 Family CLI User's Guide* or the `sccli`(1M) man pages for instructions on downloading SES firmware to the appropriate device.

Caution – Follow the upgrade instructions in the patch README file with great care to download and install firmware correctly. If the wrong firmware is installed, or the firmware is installed on the wrong device, your controller might be rendered inoperable. Always be sure to upgrade your SES firmware first before trying to determine if you need a PLD upgrade.

6.3.5 Restoring the Configuration Settings of a Powered-Off Array

If the array was inadvertently powered off during the controller replacement in a dual-controller configuration, you must perform the following steps to ensure successful completion of the cross-load. When you power on the array, the automatic firmware cross-load will perform the correct operation but must be checked.

1. **Power on the array and allow a few minutes to complete initialization.**
2. **Check that the correct firmware version is active on the array by entering one of the following commands:**
   - From the RAID firmware Main Menu, choose "view system Information" and check the Firmware Version number.
   - Enter the following CLI command and check the Revision number.

```
sccli> show inquiry
```

3. **In a dual-controller configuration where both controllers have the same version number and two different letter identifiers (such as 4.14A and 4.14B), wait a minimum of 10 minutes for firmware cross-load to be completed.**

4. **In a dual-controller configuration where the controller modules have different firmware versions (such as 4.13 and 4.15), the 4.13 firmware will cross-load to the 4.15 controller.**

Caution – Wait a minimum of 10 minutes for the firmware cross-load to be completed. If the newly installed controller is removed for any reason during the period when the status LED is amber (for 10 minutes or more), the controller can be rendered inoperable and must be returned for repair.

5. **Check that the secondary controller is active on the array by entering one of the following commands.**

   - From the RAID firmware Main Menu, choose "view and edit Peripheral devices → View Peripheral Device Status."

     The `Redundant Controller: Enabled` status indicates an initialized secondary redundant controller.

   - Enter the following CLI command.

```
sccli> show redundancy-mode
```

     The `Redundancy Status: Enabled` indicates an initialized secondary redundant controller.

6.4 Converting a Dual-Controller Array to a Single-Controller Array

If you convert a dual-controller array into a single-controller array, the Sun StorEdge Configuration Service software does not automatically recognize the change and reports that the SES and battery board from the removed controller are failed or not present.

If you are running Sun StorEdge Configuration Service software and want to avoid this message, follow the steps in the chapter titled "Maintaining the Array," in the *Sun StorEdge 3000 Family Configuration Service User's Guide*. The section containing the instructions is titled, "To Convert a Dual Controller Array to a Single Controller Array."

6.5 Converting a Single-Controller Array to a Dual-Controller Array

Note – FC and SATA single-controller arrays ship with a JBOD I/O module in the secondary controller slot. This must be removed in order to install a secondary controller.

1. **Keep the array powered on and make sure that the connected hosts are inactive.**
2. **Turn the thumbscrews on the left and right sides of the JBOD I/O module counterclockwise until the thumbscrews are disengaged from the chassis.**
3. **Grasp the handle and carefully pull out the JBOD I/O module.**
4. **Gently slide the I/O controller module into the array.**

Caution – Be sure that the module is properly inserted in the guide rails of the array and that you keep the power on.

   a. **Insert the controller FRU into the slot, and push forward until you begin to feel resistance as the connecting pins engage.**
   b. **Push the controller FRU until the connecting pins are fully seated and the RAID controller fits flush against the back plate of the RAID array.**

      Failure to insert the controller carefully as described above can cause one of the following problems:

      - The original controller might reset, causing both controllers to go offline, or the new controller might become primary and the original controller might become secondary which can cause the controllers to go offline. **Recovery:** Wait until both RAID controllers initialize and come up in redundant mode with no intervention required.
      - If the controller status LED is blinking green on both controllers, then both controllers are primary controllers. **Recovery:** Take out the new controller and reinsert it, carefully following the instructions above. If this does not remedy the problem, power-cycle the array.

5. **Turn the thumbscrews on the left and right sides of the I/O controller module clockwise until they are finger-tight, to secure the module and to make the module's front panel flush with the chassis.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

The new controller automatically becomes the secondary controller.

When the new controller FRU is installed, the controller status LED will remain amber until the controllers complete the redundant controller process, which can take more than 10 minutes. The same firmware versions must be installed on both controllers for proper redundant-controller operation.

The redundant-controller process automatically cross-loads the firmware version of the newly installed FRU to match the firmware version of the other running controller. For example, if the running controller has firmware 4.13C and the new controller has 4.15, the new controller will be cross-loaded with the 4.13C firmware of the running controller. To monitor this process, see Section 6.3.3, "Monitoring the Automatic Firmware Update with a Recently Installed Controller FRU" on page 6-9.

Caution – Wait a minimum of 10 minutes for the firmware cross-load to be completed. If the newly installed controller is removed for *any* reason during the period when the status LED is amber (for 10 minutes or more), the controller can be rendered inoperable and must be returned for repair.

If you hear an audible alarm after the firmware cross-load and see a blinking amber Event light on the front of your array, the SCSI Enclosure Services (SES) firmware or its associated Programmable Logic Device (PLD) code in the new controller has a version that is different from the code in the other I/O controller in your array. To solve this mismatch, see to Section 6.3.4, "SES Firmware Update Sometimes Required with I/O Controller Module Replacements" on page 6-10.

Note – The beep code that identifies an SES or PLD firmware mismatch is the repeating Morse code letter "R" (dot dash dot).

6. **If you want the most current version of firmware on your controllers, download the latest firmware patch as described in the release notes for your array.**
7. **Connect the cables to the new I/O controller module.**
8. **Set up the host channels for the new I/O controller module.**

   For cabling and host channel set up information, refer to the "Connecting Your Array" chapter in the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array.

Caution – You must connect the hosts to the correct host channels on the I/O controller module or your configuration will not work correctly.

6.6 I/O Controller Replacement for a Single-Controller Array

The 4.1x firmware upgrade requires Sun StorEdge CLI 2.x which is available on the Sun Download Center.

Note – The 4.11G controller firmware must be replaced with a released firmware version in a single-controller configuration.

In a single-controller chassis with 4.11G firmware, you need to perform one of the following downgrades or upgrades.

- Downgrade the 4.11G controller firmware to firmware version 3.27R:
  - FC 3.27R patch ID 113723-09 for the Sun StorEdge 3510 FC array
  - SATA 3.27R patch ID 113724-03 for the Sun StorEdge 3511 SATA array

  For 3.27 downgrade instructions, refer to Section 6.6.1, "Downgrading from Controller Firmware Version 4.1x to 3.27" on page 6-19.
- Upgrade the 4.11G firmware to the latest 4.1x firmware. Be sure that you have upgraded to the 2.x software for Sun StorEdge Configuration Service, Diagnostic Reporter, and the CLI.

  For 4.1x upgrade instructions, refer to the README file in the 4.1x patch.

Note – For information on the version 4.1x upgrade and new 2.x software, refer to the latest release notes.

To determine the firmware version of your I/O controller, check the model number. TABLE 6-2 shows the model numbers for FC and SATA I/O controllers.

TABLE 6-2 I/O Controller Model Numbers

I/O Controller	FRU Model Number	X-Option
3.27 FC controller	370-5537-06	595-6578-05
4.11G FC controller *	370-5537-07	595-6578-06
4.11I or later FC controller	370-5537-08 (or higher)	595-6578-07 (or higher)
4.1x FC controller (RoHS)	371-0532-01	594-3339-01

TABLE 6-2 I/O Controller Model Numbers *(Continued)*

I/O Controller	FRU Model Number	X-Option
3.27 SATA controller	370-6773-01	595-7419-01
4.11G SATA controller *	370-6773-02	595-7419-02
4.11I or later SATA controller	370-6773-03 (or higher)	595-7419-03 (or higher)

* In a single-controller configuration, the 4.11G firmware must be upgraded to 4.11I or later, or downgraded to 3.27.

To replace an I/O controller module in a single-controller configuration, perform the following steps.

1. **If possible, make a record of the firmware version and configuration settings before replacing the controller.**

   Use the `show configuration` CLI command to output the configuration settings to a file.

   - At the `sccli>` command prompt, type the following command:

```
sccli> show configuration filename.txt
```

   where *filename.txt* is a text file, or

```
sccli> show configuration --xml filename.xml
```

   where *filename.xml* is an `xml` file.

Note – These commands may take several minutes to complete.

2. **From the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters → Controller Unique Identifier <hex>."**

   Record the Controller Unique Identifier which combines the serial number and MAC address for each chassis and is used for network connections and worldwide names.

3. **Save NVRAM configuration settings to disk.**

   - From the RAID firmware Main Menu choose "system Functions → Controller maintenance → Save nvram to disks," and choose Yes to save the contents of NVRAM to disk.

4. **Write down the cabling configuration for the controller-to-host connections and expansion unit connections so that you can reconnect the cables correctly with the new I/O controller module.**

5. **Remove the old controller.**

   a. **Keep the array powered on and make sure that the connected hosts are inactive.**

   b. **Remove all cables and SFPs from the I/O controller module.**

   c. **Turn the thumbscrews on the left and right sides of the I/O controller module counterclockwise until the thumbscrews are disengaged from the chassis.**

   d. **Grasp the handle and carefully pull out the I/O controller module.**

6. **Insert the replacement controller.**

   a. **Keep the array powered on and gently slide the controller module into the unit.**

Caution – Be sure that the module is properly inserted into the guide rails of the array.

   b. **Insert the controller FRU into the slot, and push forward until you begin to feel resistance as the connecting pins engage.**

   c. **Push the controller FRU until the connecting pins are fully seated and the RAID controller fits flush against the back plate of the RAID array.**

   d. **Turn the thumbscrews on the left and right sides of the I/O controller module clockwise until they are finger-tight, to secure the module and to make the module's front panel flush with the chassis.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

7. **Reconnect the original cables to the new I/O controller module.**

Caution – You must connect the hosts to the correct host channels on the I/O controller module, or your configuration will not work correctly.

8. **If the old controller and the new controller have the 4.1x firmware and you had saved a 4.1x NVRAM file, from the RAID firmware Main Menu, choose "system Functions → Controller maintenance → Restore NVRAM from disks," and choose Yes to confirm.**

9. **If you have a 4.11G replacement controller which requires an upgrade or a downgrade, or want to downgrade to 3.27 firmware, download the desired firmware into the replacement controller.**

   You must upgrade or downgrade a 4.11G controller.

   If you have a 4.11I or later replacement controller module, you can downgrade it to 3.27 firmware.

   Note – Firmware version 4.1x supports a maximum of 32 partitions per logical drive. Firmware version 3.27 supports as many as 128 partitions per logical drive on Sun StorEdge 3510 FC arrays and Sun StorEdge 3511 SATA arrays. **You cannot upgrade to version 4.1x from version 3.27 if you have more than 32 partitions.**

   - **To upgrade controller firmware, refer to the latest patch README file for your array.**
     - For the Sun StorEdge 3510 FC array, use firmware 4.1x FC patch ID 113723-10 or later.
     - For the Sun StorEdge 3511 SATA array, use firmware 4.1x SATA patch ID 113724-04 or later.

   Note – When the old controller and the new controller have different firmware version numbers (e.g. 3.27 and 4.15), you cannot restore the NVRAM configuration settings from disk. You must edit the configuration settings manually.

   - **To downgrade from the 4.1x firmware to 3.27 firmware, see Section 6.6.1, "Downgrading from Controller Firmware Version 4.1x to 3.27" on page 6-19.**

10. **If the old controller and the new controller have the 4.11I or later firmware and you had saved a 4.1x NVRAM file, from the RAID firmware Main Menu, choose "system Functions → Controller maintenance → Restore NVRAM from disks," and choose Yes to confirm. Confirm that all configuration parameters are correctly set.**

11. **Confirm that the "Controller Unique Identifier" parameter is set to the value recorded in Step 2.**

    From the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters → Controller Unique Identifier <hex>."

12. **If the "Controller Unique Identifier" is not set to the value recorded in Step 2, type the value 0 (to automatically read the chassis serial number from the midplane) or type the hex value for the original serial number of the chassis (used when the midplane has been replaced).**

    The Controller Unique Identifier is used to create Ethernet MAC addresses and worldwide names. The value 0 is immediately replaced with the hex value of the chassis serial number. A nonzero value should be specified only if the chassis has

been replaced, but the original chassis serial number must be retained; this feature is especially important in a Sun Cluster environment to maintain the same disk device names in a cluster.

Caution – If the "Controller Unique Identifier" parameter has the wrong value, network connections will not work correctly and the worldwide name will be incorrect which will cause problems accessing the array.

13. **To implement the revised configuration settings, choose "system Functions → Reset controller" from the RAID firmware Main Menu, then choose Yes to confirm.**

6.6.1 Downgrading from Controller Firmware Version 4.1x to 3.27

If you have a 4.11G replacement controller module for a single-controller configuration (see TABLE 6-2 for part numbers), you must downgrade the controller firmware to the released 3.27 firmware version or upgrade to a released 4.1x firmware version.

If you have a 4.1x replacement controller module and need to downgrade to 3.27 firmware, follow these procedures as well.

Caution – Do not downgrade from controller version 4.1x to 3.27 unless you are performing a FRU replacement or in an emergency with Technical Support assistance. If you upgrade an array to 4.1x controller firmware, change one or more parameters, and then downgrade back to 3.27, you can lose all data. You can lose or corrupt all data from all logical drives due to conflicting parameters between firmware versions, such as optimization and stripe size settings which have different NVRAM structures and different defaults.

Earlier versions of the controller firmware work with the latest SES, PLD, SAF-TE, and software versions. There is no need to downgrade any of these components if you downgrade the controller version. For instance, CLI version 2.3 is compatible with controller version 3.27. CLI 1.6.2 can be used to downgrade to 3.27 controller firmware but cannot be used to upgrade to 4.1x controller firmware.

Note – While an upgrade script exists for upgrading from controller firmware version 3.27 to version 4.1x, the script is not backwards compatible. You cannot use the script to downgrade from controller version 4.1x to version 3.27.

The CLI `download controller-firmware` command restores factory defaults with downgrades and does not restore:

- Controller IP address – You must have a serial connection to restore the IP address, and the serial connection must be set to 38400.
- Net mask and gateway settings and baud rate for the serial port.
- Host LUN filter settings – type, access mode, and name.
- Channel data rate – FC and SATA arrays: If the channel data rate was set to 1 GHz or 2 GHz, after the download command is run, the channel speed is set to auto (auto-negotiation). Since a FC channel communicates at a rate of either 1 GHz or 2 GHz, the "Auto" setting uses the best rate for communications at the time.
- More than 8 logical drives.
- Customized parameter settings – Record all custom settings prior to the downgrade. The CLI `show configuration` command does not include all firmware parameters. Be sure to record settings that are in the firmware only, namely sector/head/cylinder parameters and host LUN filter parameters.

To downgrade from controller firmware 4.1x to 3.27 firmware, perform the following steps.

1. **Change your working directory to the directory in which the patch was unpacked and confirm that the 3.27 controller firmware file is present using the `ls` command. The file must be one of the following:**
   - SUN327R-3510.bin for the 3510 FC array (in patch 113723-09)
   - SUN327R-3511.bin for the 3511 SATA array (in patch 113724-03)
2. **Invoke the Sun StorEdge CLI.**
3. **Verify that you are running CLI version 1.6.2 or 2.x with the `version` command.**
4. **Verify the product and revision of the array by typing the following command:**

```
sccli> show inquiry
```

Confirm that the correct product name is displayed. Otherwise, this patch does not apply. Select a different device or discontinue installation of this patch. If the firmware version reported is 411G or later, continue with Step 5.

5. **Version 3.27 only supports 8 logical drives. To confirm that the array has no more than 8 logical drives, at the `sccli>` prompt, type:**

```
sccli> show logical-drive
```

Caution – If you have more than 8 logical drives, do not perform this downgrade. You will lose all data above the 8 logical drive limit.

6. **If feasible, save the configuration in a separate location.**

   If you are unable to restore the 3.27 configuration, you can reference this file.

   - At the `sccli>` command prompt, type the following command:

```
sccli> show configuration filename.txt
```

   where *filename.txt* is a text file, or

```
sccli> show configuration --xml filename.xml
```

   where *filename.xml* is an `xml` file.

Note – These commands may take several minutes to complete.

7. **Stop all I/O to the array before beginning the controller firmware downgrade and unmount any filesystems or volumes mounted from the array.**

   Since the Sun StorEdge Configuration Service agent may interfere with firmware downloads, it is necessary to stop any agent that may be running on any host connected to the array controller. To stop the Sun StorEdge Configuration Service agent, log in as root on each host connected to the array and on which the SUNWsscs package has been installed, and issue the following shell command:

```
# /etc/init.d/ ssagent stop
```

   If the Sun StorEdge Configuration Service agent is running on a Microsoft Windows system connected to the array, use the Services application to stop the agent service.

   StorADE, or any other application which monitors the status of the enclosure, may also interfere with controller or SAF-TE firmware downloads. Stop the StorADE agent software, or any other software that monitors the array, following the procedures described in the documentation for that application.

8. **At the `sccli>` prompt, type:**

```
sccli> download controller-firmware -r filename
```

where *filename* is `SUN327R-3510.bin` for the 3510 FC array or `SUN327R-3511.bin` for the 3511 SATA array.

Note – Disregard the CLI message that a script is available to automate the download; the script is only for upgrades.

The `download controller-firmware` command will display messages indicating that it is downloading the firmware, programming the controller's flash memory, and "engaging" the new firmware. Wait until the `sccli>` prompt appears again before proceeding. This might take 10 minutes or more.

9. **To re-establish communication with the array, use the serial connection to restore the IP address, netmask, and gateway.**

10. **To complete the downgrade, access the CLI and enter the following commands:**

```
sccli> reset nvram
sccli> reset controller
```

11. **To re-establish communication with the array, use the serial connection to restore the IP address, netmask, and gateway.**

12. **To verify the revision of the array, type the following command:**

```
sccli> show inquiry
```

Confirm that the firmware revision is now reported as `327R` for FC and SATA arrays.

13. **Reconfigure your array to the desired configuration.**

    a. **If you saved a 3.27 configuration file to restore, type:**

```
sccli> download nvram filename
```

where *filename* is the name of the file that contains the 3.27 configuration.

    b. **Otherwise, configure the array using the CLI or the firmware application.**

Caution – Do not restore a 4.1x configuration on a 3.27 controller. This may cause data loss.

14. **Confirm that the Controller Unique Identifier parameter value is correct.**

    From the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters → Controller Unique Identifier <hex>."

15. **If the "Controller Unique Identifier" is not set, type the value 0 (to automatically read the chassis serial number from the midplane) or type the hex value for the original serial number of the chassis (used when the midplane has been replaced).**

    The Controller Unique Identifier is used to create Ethernet MAC addresses and worldwide names. The value 0 is immediately replaced with the hex value of the chassis serial number. A nonzero value should be specified only if the chassis has been replaced, but the original chassis serial number must be retained; this feature is especially important in a Sun Cluster environment to maintain the same disk device names in a cluster.

Caution – If the "Controller Unique Identifier" parameter has the wrong value, network connections will not work correctly and the worldwide name will be incorrect which will cause problems accessing the array.

16. **To implement the revised configuration settings, choose "system Functions → Reset controller" from the RAID firmware Main Menu, then choose Yes to confirm.**

6.6.2 SES Firmware Update

Periodically, firmware upgrades are made available as patches that you can download from SunSolve™ Online, located at:

http://sunsolve.sun.com

Sun StorEdge 3510 FC and Sun StorEdge 3511 SATA array patches contain the most current version of the controller, SES, and PLD firmware.

SunSolve has extensive search capabilities that can help you find the appropriate patch, as well as regular patch reports and alerts to let you know when firmware upgrades and related patches become available. In addition, SunSolve provides reports about bugs that have been fixed in patch updates.

Each patch includes an associated README text file that provides detailed instructions about how to download and install that patch. But, generally speaking, all firmware downloads follow the same steps:

- Locating the patch on SunSolve that contains the firmware upgrade you want.
- Downloading the patch to a location on your network.
- Using your array software (Sun StorEdge CLI) to download the firmware to the device it updates.

Refer to the release notes for your array for the latest patch available for your array at the time of release.

Caution – Follow the upgrade instructions in the patch README file with great care to download and install firmware correctly. If the wrong firmware is installed, or the firmware is installed on the wrong device, your controller might be rendered inoperable. Always be sure to upgrade your SES firmware first before trying to determine if you need a PLD upgrade.

CHAPTER 7

Sun StorEdge 3320 SCSI Controller FRUs

This chapter provides instructions for removing and installing SCSI controller modules in Sun StorEdge 3320 SCSI arrays.

Topics covered in this chapter are:

- Section 7.1, "Replacing a SCSI Controller Module" on page 7-2
- Section 7.2, "Saving the NVRAM Configuration Settings" on page 7-4
- Section 7.3, "SCSI Controller Replacement for a Dual-Controller Array" on page 7-4
  - Section 7.3.1, "Removing a SCSI Controller Module" on page 7-5
  - Section 7.3.2, "Installing a SCSI Controller Module" on page 7-5
  - Section 7.3.3, "Monitoring the Automatic Firmware Update for a Recently Installed Controller FRU" on page 7-7
  - Section 7.3.4, "Restoring the Configuration Settings of a Powered-Off Array" on page 7-8
- Section 7.4, "Converting a Dual-Controller Array to a Single-Controller Array" on page 7-9
- Section 7.5, "Converting a Single-Controller Array to a Dual-Controller Array" on page 7-9
- Section 7.6, "SCSI Controller Replacement for a Single-Controller Array" on page 7-11

Note – Be sure to follow Section 1.2, "Static Electricity Precautions" on page 1-8 for all procedures.

7.1 Replacing a SCSI Controller Module

SCSI controller modules are hot-swappable. In the event that it is impossible or impractical to halt I/O from hosts to the array, a controller can be replaced while the surviving controller is active and servicing I/O.

However, if your configuration enables you to halt I/O during the controller replacement procedure without disruption, it is a good idea to do so. With write-back cache enabled under heavy I/O, cache synchronization can take three hours or more to complete. During this time, your controller will display "preparing failback" status and the LED remains amber.

Note – Under firmware version 4.1x, a failed controller forces write-through cache mode by default and is only subject to the 10 minute cross-load time. However, if the default event trigger for a failed controller has been set to DISABLED, cache synchronization could take over three hours. For details regarding write policy and event triggers, refer to the *Sun StorEdge 3000 Family RAID Firmware User's Guide*.

It is also possible that hardware errors or configuration errors may be present but undetected, resulting in an unserviceable condition that will only be revealed when the hot-swap is underway. For instance, it is possible that a hardware module might be improperly seated.

It is good practice before replacing a controller FRU to try to verify your system's health. Do not replace a working controller on a channel that is offline.

When a controller fails in a dual-controller configuration, the remaining controller automatically becomes the primary controller, if it is not already. If you replace a controller that has not failed, force-fail the controller to be replaced via one of the following methods.

- From the RAID firmware Main Menu:
  - To fail the primary controller, choose "view and edit Peripheral devices → Set Peripheral Device Entry → Redundant Controller – Primary → force Primary controller failure".
  - To fail the secondary controller, choose "view and edit Peripheral devices → Set Peripheral Device Entry → Redundant Controller – Primary → force Secondary controller failure".

- From the CLI:
  - To fail the primary controller, type:

```
sccli> fail primary
```

  - To fail the secondary controller, type:

```
sccli> fail secondary
```

Note – If you are running version 2.0 or greater of the Sun StorEdge CLI, before issuing the `fail` command, perform a `show redundancy` command to check the status of the redundant pair. This command will also display the position of the primary controller. Also perform a `show events` command for each controller to view any error messages. The dual-controller array is healthy if the Redundancy mode is Active-Active and the status is Enabled. The single-controller array is healthy if the Redundancy mode is Active-Active and the status is Scanning.

For details on the `fail`, `show redundancy`, and `show events` commands, refer to the *Sun StorEdge 3000 Family CLI User's Guide*.

When replacing a controller FRU in a single-controller chassis, be sure to follow the instructions in Section 7.6, "SCSI Controller Replacement for a Single-Controller Array" on page 7-11.

It is a recommended practice to always check the SunSolve Download Center located on `http://sunsolve.sun.com` for the latest available firmware upgrades.

Note – Be sure to check and update SAF-TE firmware in all configurations to provide the best performance. The latest SAF-TE firmware is included in each controller firmware patch.

Note – When a controller is installed and initialized or when configuration settings are changed, you are strongly advised to make a record of the new configuration settings and firmware version. This is particularly important in a single controller configuration for re-establishing your configuration settings when a controller is replaced. You can record this information in the "Record of Settings" appendix in the *Sun StorEdge 3000 Family RAID Firmware User's Guide*.

Note – The batteries in controller FRUs experience discharge during shipment and might require an extended charging cycle upon initial power-up. Nominal battery operation is achieved when the battery status LED changes from amber to flashing green within 25 minutes after the initial power cycle. If the battery status LED remains amber for more than 25 minutes after the initial power-up, then the unit must be power cycled to initiate the extended charging cycle. If the battery status LED remains amber for more than 30 minutes after initiating the extended charging cycle, contact Sun service personnel for additional instructions.

7.2 Saving the NVRAM Configuration Settings

Before replacing a controller module, save the NVRAM configuration settings to disk. The saved NVRAM file can be used to restore configuration settings only if the replacement controller has the same firmware version as the defective controller.

1. **From the RAID firmware Main Menu, choose "system Functions → controller maintenance → save NVRAM to disks."**
2. **Choose Yes to confirm.**

   A message informs you that NVRAM information has been successfully saved.

7.3 SCSI Controller Replacement for a Dual-Controller Array

When a controller is replaced in a dual-controller configuration, the controller firmware of the remaining functional controller automatically overwrites the firmware of the new replacement controller to maintain compatibility. This is referred to as *cross-loading*. Cross-loading uses the NVRAM configuration settings to synchronize the firmware version of the newly installed controller to match the firmware version of the running controller.

7.3.1 Removing a SCSI Controller Module

1. **Keep the array powered on.**
2. **Remove all cables from the controller module.**
3. **Turn the thumbscrews on the left and right sides of the controller module counterclockwise until the thumbscrews are disengaged from the chassis.**
4. **Hold the thumbscrews, and pull out the controller module.**

7.3.2 Installing a SCSI Controller Module

1. **Keep the array powered on.**

Caution – DO NOT POWER OFF the chassis when you replace a controller module. Multiple problems can occur. If you power off the array and replace a controller module in a dual-controller configuration, the replacement controller could become the primary controller and overwrite any configuration settings previously set. Additionally, if the array is powered off incorrectly, data that is written to cache and that has not been completely written to the disks will be lost. If you powered off the array during replacement, see Section 7.3.4, "Restoring the Configuration Settings of a Powered-Off Array" on page 7-8.

2. **Gently slide the replacement controller module into the array.**

Caution – Be sure that the module is properly inserted into the guide rails of the array and that you keep the power on. If you power off and then replace the module, you will have to continue with additional steps. See Section 7.3.4, "Restoring the Configuration Settings of a Powered-Off Array" on page 7-8.

   a. **Insert the controller FRU into the slot, and push forward until you begin to feel resistance as the connecting pins engage.**

   b. **Push the controller FRU until the connecting pins are fully seated and the RAID controller fits flush against the back plate of the RAID array.**

      Failure to insert the controller carefully as described above can cause one of the following problems:

      - The surviving controller might reset, causing both controllers to go offline, or the replacement controller might become primary and the surviving controller might become secondary which can cause the controllers to go offline. **Recovery:** Wait until both RAID controllers initialize and come up in redundant mode with no intervention required.

- If the controller status LED is blinking green on both controllers, then both controllers are primary controllers. **Recovery:** Take out the replacement controller and reinsert it, carefully following the instructions above. If this does not remedy the problem, power-cycle the array.

3. **Turn the thumbscrews on the left and right sides of the controller module clockwise until they are finger-tight, to secure the module and to make the module's front panel flush with the chassis.**

   To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

   The new controller automatically becomes the secondary controller.

   In a redundant controller configuration where a new controller FRU is installed, the controller status LED will remain amber until the controllers complete the redundant controller process, which can take more than 10 minutes. Identical firmware versions on both controllers is required for proper redundant controller operation.

   The redundant controller process automatically cross-loads the firmware version of the newly installed controller FRU to match the firmware version of the other running controller. For example, if the running controller has firmware 4.12B and the new controller has 4.12E, the new controller will be cross-loaded with the 4.12B firmware of the running controller.

Caution – Wait a minimum of 10 minutes for the firmware cross-load to be completed. If the newly installed controller is removed for *any* reason during the period when the status LED is amber (for 10 minutes or more), the controller can be rendered inoperable and must be returned for repair.

To monitor this process, see Section 7.3.3, "Monitoring the Automatic Firmware Update for a Recently Installed Controller FRU" on page 7-7.

4. **If you want the most current version of firmware on your controllers, download the latest firmware patch as described in the release notes for your array.**

Caution – Follow the upgrade instructions in the patch README file or the downgrade instructions in this document with great care. If the wrong firmware is installed, or the firmware is installed on the wrong device, your controller might be rendered inoperable.

5. **Reconnect the original cables to the new controller module.**

Caution – You must connect the hosts to the correct host channels on the controller module or your configuration will not work correctly.

7.3.3 Monitoring the Automatic Firmware Update for a Recently Installed Controller FRU

To monitor the status of the automatic firmware update, use the Sun StorEdge CLI `show redundancy` command. The Sun StorEdge CLI will display the progression of "Failed," "Scanning," "Detected" and "Enabled" states.

Note – If you have not installed the Sun StorEdge CLI software, you must install it from the product CD for your array, or from the Sun Download Center website. For details, see the release notes for your array.

- **Initial Failed Status Response:** This is the response to the command upon a controller failure and is shown for completeness.

```
sccli> show redundancy
sccli: selected se3000://210.7.180.17:58632 [SUN StorEdge 3320
SN#0043E6]
 Primary controller serial number: 8008583
 Redundancy mode: Active-Active
 Redundancy status: Failed
 Secondary controller serial number: 8002663
```

- **Scanning Status: Install Controller FRU.** The installed controller is performing self-test and scanning disk channels. This is also the state where the controller will update the firmware on the newly installed controller if not identical to the running firmware revision. The controllers can remain in this state for up to 10 minutes depending upon system activity.

```
...
Redundancy status: Scanning
Secondary controller serial number: 0
```

- **Detected Status: Redundant Controller Process Starts.** The installed controller has completed the scanning of the disk channels, updated installed controller firmware as required, and communicated to the primary controller. This status is transitional and normally cannot be detected unless repetitive operations are executed.

```
...
Redundancy status: Detected
Secondary controller serial number: 0
```

- **Enabled State: Redundant Controller Procedure Completed.** The installed controller has completed the redundant controller procedure enabling the active-active operation.

```
...
Redundancy status: Enabled
Secondary controller serial number: 8006511
```

7.3.4 Restoring the Configuration Settings of a Powered-Off Array

If the array was inadvertently powered off during the controller replacement in a dual-controller configuration, you must perform the following steps to ensure successful operation of your array.

1. **In a dual-controller configuration where both controllers have the same version number (such as 4.12B), power on the array and wait a minimum of 10 minutes for firmware cross-load to occur.**

Caution – If the newly installed controller is removed for *any* reason during the period when the status LED is amber (for 10 minutes or more), the controller can be rendered inoperable and must be returned for repair.

2. **Confirm that the secondary controller is active on the array by entering one of the following commands.**
   - Using the serial port connection to the firmware application, from the RAID firmware Main Menu, choose "view and edit Peripheral devices → View Peripheral Device Status."

     The `Redundant Controller: Enabled` status indicates an initialized secondary redundant controller.
   - Enter the following CLI command.

```
sccli> show redundancy-mode
```

     The `Redundancy Status: Enabled` indicates an initialized secondary redundant controller.

7.4 Converting a Dual-Controller Array to a Single-Controller Array

If one controller fails in a dual-controller configuration, you might want to run a single controller for an extended period of time so that the array does not display as degraded.

For instructions on converting a dual-controller configuration to a single-controller configuration, refer to the section titled "To Convert a Dual Controller Array to a Single Controller Array" in the *Sun StorEdge 3000 Family Configuration Service User's Guide*.

7.5 Converting a Single-Controller Array to a Dual-Controller Array

---

Note – SCSI single-controller arrays ship with a blanking panel covering the secondary controller slot. This must be removed in order to install a secondary controller.

---

1. **Keep the array powered on and make sure that the connected hosts are inactive.**
2. **Turn the thumbscrews on the left and right sides of the blanking panel and remove it.**
3. **Gently slide the new controller module into the array.**

Caution – Be sure that the module is properly inserted in the guide rails of the array and that you keep the power on.

---

   a. **Insert the controller FRU into the slot, and push forward until you begin to feel resistance as the connecting pins engage.**
   b. **Push the controller FRU until the connecting pins are fully seated and the RAID controller fits flush against the back plate of the RAID array.**

      Failure to insert the controller carefully as described above can cause one of the following problems:

- The original controller might reset, causing both controllers to go offline, or the new controller might become primary and the original controller might become secondary which can cause the controllers to go offline. **Recovery:** Wait until both RAID controllers initialize and come up in redundant mode with no intervention required.
- If the controller status LED is blinking green on both controllers, then both controllers are primary controllers. **Recovery:** Take out the new controller and reinsert it, carefully following the instructions above. If this does not remedy the problem, power-cycle the array.

4. **Turn the thumbscrews on the left and right sides of the controller module clockwise until they are finger-tight to secure the module and to make the module's front panel flush with the chassis.**

   To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

   The new controller automatically becomes the secondary controller.

   When the new controller FRU is installed, the controller status LED will remain amber until the controllers complete the redundant controller process, which can take more than 10 minutes. The same firmware versions must be installed on both controllers for proper redundant-controller operation.

   The redundant-controller process automatically cross-loads the firmware version of the newly installed controller FRU to match the firmware version of the other running controller. For example, if the running controller has firmware 4.12B and the new controller has 4.15, the new controller will be cross-loaded with the 4.12B firmware of the running controller. To monitor this process, see Section 7.3.3, "Monitoring the Automatic Firmware Update for a Recently Installed Controller FRU" on page 7-7.

Caution – Wait a minimum of 10 minutes for the firmware cross-load to be completed. If the newly installed controller is removed for *any* reason during the period when the status LED is amber (for 10 minutes or more), the controller can be rendered inoperable and must be returned for repair.

5. **If you want the most current version of firmware on your controllers, download the latest firmware patch as described in the release notes for your array.**

6. **Set up the host channels for the new controller module.**

   For host channel set up information, refer to the "Connecting Your Array" chapter in the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array.

Caution – You must set the hosts to the correct host channels on the controller module or your configuration will not work correctly.

7.6 SCSI Controller Replacement for a Single-Controller Array

To replace a SCSI controller module in a single-controller configuration, perform the following steps.

1. **If possible, make a record of the firmware version and configuration settings before replacing the controller.**

   a. **Use the** `show configuration` **CLI command to output the configuration settings to a file. Refer to the** *Sun StorEdge 3000 Family CLI User's Guide* **for more information.**

   b. **Save NVRAM configuration settings to disk.**

      From the RAID firmware Main Menu choose "system Functions → Controller maintenance → Save nvram to disks," and choose Yes to save the contents of NVRAM to disk.

   c. **Record the Controller Unique Identifier which combines the serial number and MAC address for each chassis and is used for network connections.**

      From the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters → Controller Unique Identifier <hex>."

2. **Remove the old controller.**

   a. **Keep the array powered on and make sure that the connected hosts are inactive.**

   b. **Remove all cables from the controller module.**

   c. **Turn the thumbscrews on the left and right sides of the controller module counterclockwise until the thumbscrews are disengaged from the chassis.**

   d. **Hold the thumbscrews, and carefully pull out the controller module.**

3. **Insert the replacement controller.**

   a. **Keep the array powered on.**

   b. **Insert the controller FRU into the slot, and push forward until you begin to feel resistance as the connecting pins engage.**

   c. **Push the controller FRU until the connecting pins are fully seated and the RAID controller fits flush against the back plate of the RAID array.**

Caution – Be sure that the module is properly inserted into the guide rails of the array.

d. Turn the thumbscrews on the left and right sides of the controller module clockwise until they are finger-tight, to secure the module and to make the module's front panel flush with the chassis.

To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

4. Reconnect the original cables to the new controller module.

5. Download the desired firmware version from SunSolve.

a. To upgrade the firmware to version 4.1x, refer to the patch README file supplied with the firmware.

6. Confirm that the "Controller Unique Identifier" parameter is set to the value recorded in Step 1c.

a. From the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters → Controller Unique Identifier <hex>."

b. If the "Controller Unique Identifier" is not set to the value recorded in step 1c, type the value 0 (to automatically read the chassis serial number from the midplane) or type the hex value for the original serial number of the chassis (used when the midplane has been replaced).

The Controller Unique Identifier is used to create Ethernet MAC addresses and worldwide names. The value 0 is immediately replaced with the hex value of the chassis serial number. A nonzero value should be specified only if the chassis has been replaced, but the original chassis serial number must be retained; this feature is especially important in a Sun Cluster environment, to maintain the same disk device names in a cluster.

c. To implement the revised configuration settings, choose "system Functions → Reset controller" from the RAID firmware Main Menu, then choose Yes to confirm.

7. If the Sun StorEdge Configuration Service agent was stopped, restart it.

- On Solaris and other UNIX systems, use the following command:

```
# /etc/init.d/ssagent start
```

- On Microsoft Windows systems, use the "Services" utility to start the agent.

If other software such as StorADE was stopped, restart it following the procedures in the documentation for that software.

CHAPTER 8

Sun StorEdge 3310 SCSI Controller FRUs

This chapter provides instructions for removing and installing SCSI controller modules in Sun StorEdge 3310 SCSI arrays.

Topics covered in this chapter are:

- Section 8.1, "Replacing a SCSI Controller Module" on page 8-2
- Section 8.2, "Saving the NVRAM Configuration Settings" on page 8-5
- Section 8.3, "SCSI Controller Replacement for a Dual-Controller Array" on page 8-5
  - Section 8.3.1, "Removing a SCSI Controller Module" on page 8-6
  - Section 8.3.2, "Installing a SCSI Controller Module" on page 8-6
  - Section 8.3.3, "Monitoring the Automatic Firmware Update for a Recently Installed Controller FRU" on page 8-8
  - Section 8.3.4, "Restoring the Configuration Settings of a Powered-Off Array" on page 8-9
- Section 8.4, "Converting a Dual-Controller Array to a Single-Controller Array" on page 8-11
- Section 8.5, "Converting a Single-Controller Array to a Dual-Controller Array" on page 8-11
- Section 8.6, "SCSI Controller Replacement for a Single-Controller Array" on page 8-13
  - Section 8.6.1, "Downgrading From Controller Firmware Version 3.66 to 3.25" on page 8-15

Note – Be sure to follow Section 1.2, "Static Electricity Precautions" on page 1-8 for all procedures.

8.1 Replacing a SCSI Controller Module

SCSI controller modules are hot-swappable. In the event that it is impossible or impractical to halt I/O from hosts to the array, a controller can be replaced while the surviving controller is active and servicing I/O.

However, if your configuration enables you to halt I/O during the controller replacement procedure without disruption, it is a good idea to do so. With write-back cache enabled under heavy I/O, cache synchronization can take three hours or more to complete. During this time, your controller will display "preparing failback" status and the LED remains amber.

Note – Under firmware version 4.1x, a failed controller forces write-through cache mode by default and is only subject to the 10 minute cross-load time. However, if the default event trigger for a failed controller has been set to DISABLED, cache synchronization could take over three hours. For details regarding write policy and event triggers, refer to the *Sun StorEdge 3000 Family RAID Firmware User's Guide*.

It is also possible that hardware errors or configuration errors may be present but undetected, resulting in an unserviceable condition that will only be revealed when the hot-swap is underway. For instance, it is possible that a hardware module might be improperly seated.

It is good practice before replacing a controller FRU to try to verify your system's health. Do not replace a working controller on a channel that is offline.

When a controller fails in a dual-controller configuration, the remaining controller automatically becomes the primary controller, if it is not already. If you replace a controller that has not failed, force-fail the controller to be replaced via one of the following methods.

- From the RAID firmware Main Menu:
  - To fail the primary controller, choose "view and edit Peripheral devices → Set Peripheral Device Entry → Redundant Controller – Primary → force Primary controller failure".
  - To fail the secondary controller, choose "view and edit Peripheral devices → Set Peripheral Device Entry → Redundant Controller – Primary → force Secondary controller failure".

- From the CLI:
  - To fail the primary controller, type:

```
sccli> fail primary
```

  - To fail the secondary controller, type:

```
sccli> fail secondary
```

Note – If you are running version 2.0 or greater of the Sun StorEdge CLI, before issuing the `fail` command, perform a `show redundancy` command to check the status of the redundant pair. This command will also display the position of the primary controller. Also perform a `show events` command for each controller to view any error messages. The dual-controller array is healthy if the Redundancy mode is Active-Active and the status is Enabled. The single-controller array is healthy if the Redundancy mode is Active-Active and the status is Scanning.

For details on the `fail`, `show redundancy`, and `show events` commands, refer to the *Sun StorEdge 3000 Family CLI User's Guide*.

To provide maximum usability, the Sun StorEdge 3310 SCSI array controller module has **controller firmware version 3.66 which is only available in SCSI FRUs** and which provides the following functions:

- **In a dual-controller chassis**, the firmware in the active controller will automatically be loaded to this FRU. The 3.66 firmware provides this cross-load functionality.

  When a controller is replaced in a dual-controller configuration, the controller firmware of the remaining functional controller automatically overwrites the firmware of the new replacement controller to maintain compatibility. This is referred to as *cross-loading*. Cross-loading uses the NVRAM configuration settings to synchronize the firmware version of the newly installed controller to match the firmware version of the running controller.

- **In a single-controller chassis, the 3.66 firmware cannot be used by itself and must have a released version of 3.25 or 4.1x firmware downloaded to the controller FRU.** The SCSI firmware patches available on SunSolve for the single-controller FRU configurations will be:
  - SCSI patch ID 113722-09 for 3.25W firmware
  - SCSI patch ID 113722-10 for 4.13B or later firmware

  To upgrade the 3.66 firmware to 4.1x firmware for a single-controller configuration, refer to the patch README instructions.

To downgrade the 3.66 firmware to 3.25 firmware for a single-controller configuration, refer to Section 8.6.1, "Downgrading From Controller Firmware Version 3.66 to 3.25" on page 8-15.

When replacing a controller FRU in a single-controller chassis, be sure to follow the instructions in Section 8.6, "SCSI Controller Replacement for a Single-Controller Array" on page 8-13.

It is a recommended practice to always check the SunSolve Download Center located on `http://sunsolve.sun.com` for the latest available firmware upgrades.

Note – Be sure to check and update SAF-TE firmware in all configurations to provide the best performance. The latest SAF-TE firmware is included in each controller firmware patch.

Note – When a controller is installed and initialized or when configuration settings are changed, you are strongly advised to make a record of the new configuration settings and firmware version. This is particularly important in a single controller configuration for re-establishing your configuration settings when a controller is replaced. You can record this information in the "Record of Settings" appendix in the *Sun StorEdge 3000 Family RAID Firmware User's Guide*.

Note – The batteries in controller FRUs experience discharge during shipment and might require an extended charging cycle upon initial power-up. Nominal battery operation is achieved when the battery status LED changes from amber to flashing green within 25 minutes after the initial power cycle. If the battery status LED remains amber for more than 25 minutes after the initial power-up, then the unit must be power cycled to initiate the extended charging cycle. If the battery status LED remains amber for more than 30 minutes after initiating the extended charging cycle, contact Sun service personnel for additional instructions.

This section includes the following topics:

- Section 8.2, "Saving the NVRAM Configuration Settings" on page 8-5
- Section 8.3, "SCSI Controller Replacement for a Dual-Controller Array" on page 8-5
  - Section 8.3.1, "Removing a SCSI Controller Module" on page 8-6
  - Section 8.3.2, "Installing a SCSI Controller Module" on page 8-6
  - Section 8.3.3, "Monitoring the Automatic Firmware Update for a Recently Installed Controller FRU" on page 8-8

- Section 8.3.4, “Restoring the Configuration Settings of a Powered-Off Array” on page 8-9
- Section 8.6, “SCSI Controller Replacement for a Single-Controller Array” on page 8-13
  - Section 8.6.1, “Downgrading From Controller Firmware Version 3.66 to 3.25” on page 8-15

8.2 Saving the NVRAM Configuration Settings

Before replacing a controller module, save the NVRAM configuration settings to disk. The saved NVRAM file can be used to restore configuration settings only if the replacement controller has the same firmware version as the defective controller.

1. **From the RAID firmware Main Menu, choose “system Functions → controller maintenance → save NVRAM to disks.”**
2. **Choose Yes to confirm.**

   A message informs you that NVRAM information has been successfully saved.

8.3 SCSI Controller Replacement for a Dual-Controller Array

To determine the firmware version of your SCSI controller, check the model number. TABLE 8-1 shows the model numbers for SCSI controllers.

TABLE 8-1 SCSI Controller Model Numbers

SCSI Controller	FRU Model Number	X-Option
3.25 SCSI controller (discontinued)	370-5403-03	595-6572-03
3.66 SCSI controller	370-5403-05	595-6572-05

To replace a 4.1x SCSI controller module with a 3.25 SCSI controller module, see Section A.2, “Replacing a 4.1x Controller with a 3.25 Controller (Sun StorEdge 3310 SCSI Controller FRUs Only)” on page A-6.

Caution – Cross-loading does not work when you replace a 4.1x SCSI controller with a 3.25 SCSI controller in a dual-controller chassis. If you replace a 4.1x controller with a 3.25 controller in this configuration without upgrading the 3.25 controller, the replacement controller will not be recognized.

For all other dual-controller configurations, perform the following procedures.

8.3.1 Removing a SCSI Controller Module

1. **Keep the array powered on.**
2. **Remove all cables from the controller module.**
3. **Turn the thumbscrews on the left and right sides of the controller module counterclockwise until the thumbscrews are disengaged from the chassis.**
4. **Hold the thumbscrews, and pull out the controller module.**

8.3.2 Installing a SCSI Controller Module

1. **Keep the array powered on.**

Caution – DO NOT POWER OFF the chassis when you replace a controller module. Multiple problems can occur. If you power off the array and replace a controller module in a dual-controller configuration, the replacement controller could become the primary controller and overwrite any configuration settings previously set. Additionally, if the array is powered off incorrectly, data that is written to cache and that has not been completely written to the disks will be lost. If you powered off the array during replacement, see Section 8.3.4, "Restoring the Configuration Settings of a Powered-Off Array" on page 8-9.

2. **Gently slide the replacement controller module into the array.**

Caution – Be sure that the module is properly inserted into the guide rails of the array and that you keep the power on. If you power off and then replace the module, you will have to continue with additional steps. See Section 8.3.4, "Restoring the Configuration Settings of a Powered-Off Array" on page 8-9.

   a. **Insert the controller FRU into the slot, and push forward until you begin to feel resistance as the connecting pins engage.**

b. **Push the controller FRU until the connecting pins are fully seated and the RAID controller fits flush against the back plate of the RAID array.**

   Failure to insert the controller carefully as described above can cause one of the following problems:

   - The surviving controller might reset, causing both controllers to go offline, or the replacement controller might become primary and the surviving controller might become secondary which can cause the controllers to go offline. **Recovery:** Wait until both RAID controllers initialize and come up in redundant mode with no intervention required.
   - If the controller status LED is blinking green on both controllers, then both controllers are primary controllers. **Recovery:** Take out the replacement controller and reinsert it, carefully following the instructions above. If this does not remedy the problem, power-cycle the array.

3. **Turn the thumbscrews on the left and right sides of the controller module clockwise until they are finger-tight, to secure the module and to make the module's front panel flush with the chassis.**

   To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

   The new controller automatically becomes the secondary controller.

   In a redundant controller configuration where a new controller FRU is installed, the controller status LED will remain amber until the controllers complete the redundant controller process, which can take more than 10 minutes. Identical firmware versions on both controllers is required for proper redundant controller operation.

   The redundant controller process automatically cross-loads the firmware version of the newly installed controller FRU to match the firmware version of the other running controller. For example, if the running controller has firmware 4.15C and the new controller has 4.15E, the new controller will be cross-loaded with the 4.15C firmware of the running controller.

Caution – Wait a minimum of 10 minutes for the firmware cross-load to be completed. If the newly installed controller is removed for *any* reason during the period when the status LED is amber (for 10 minutes or more), the controller can be rendered inoperable and must be returned for repair.

To monitor this process, see Section 8.3.3, "Monitoring the Automatic Firmware Update for a Recently Installed Controller FRU" on page 8-8.

4. **If you want the most current version of firmware on your controllers, download the latest firmware patch as described in the release notes for your array.**

Caution – Follow the upgrade instructions in the patch README file or the downgrade instructions in this document with great care. If the wrong firmware is installed, or the firmware is installed on the wrong device, your controller might be rendered inoperable.

Note – If you are using 3.25W or earlier controller firmware and do not want to upgrade to version 4.1x, you can download the most recent 3.25W firmware patch 113722-09 for the Sun StorEdge 3310 SCSI array from sunsolve.sun.com.

5. **Reconnect the original cables to the new controller module.**

Caution – You must connect the hosts to the correct host channels on the controller module or your configuration will not work correctly.

8.3.3 Monitoring the Automatic Firmware Update for a Recently Installed Controller FRU

To monitor the status of the automatic firmware update, use the Sun StorEdge CLI `show redundancy` command. The Sun StorEdge CLI will display the progression of "Failed," "Scanning," "Detected" and "Enabled" states.

Note – If you have not installed the Sun StorEdge CLI software, you must install it from the product CD for your array, or from the Sun Download Center website. For details, see the release notes for your array.

- **Initial Failed Status Response:** This is the response to the command upon a controller failure and is shown for completeness.

```
sccli> show redundancy
sccli: selected se3000://210.7.180.17:58632 [SUN StorEdge 3310
SN#0043E6]
 Primary controller serial number: 8008583
 Redundancy mode: Active-Active
 Redundancy status: Failed
 Secondary controller serial number: 8002663
```

- **Scanning Status: Install Controller FRU.** The installed controller is performing self-test and scanning disk channels. This is also the state where the controller will update the firmware on the newly installed controller if not identical to the running firmware revision. The controllers can remain in this state for up to 10 minutes depending upon system activity.

```
...
Redundancy status: Scanning
Secondary controller serial number: 0
```

- **Detected Status: Redundant Controller Process Starts.** The installed controller has completed the scanning of the disk channels, updated installed controller firmware as required, and communicated to the primary controller. This status is transitional and normally cannot be detected unless repetitive operations are executed.

```
...
Redundancy status: Detected
Secondary controller serial number: 0
```

- **Enabled State: Redundant Controller Procedure Completed.** The installed controller has completed the redundant controller procedure enabling the active-active operation.

```
...
Redundancy status: Enabled
Secondary controller serial number: 8006511
```

8.3.4 Restoring the Configuration Settings of a Powered-Off Array

If the array was inadvertently powered off during the controller replacement in a dual-controller configuration, you must perform the following steps to ensure successful operation of your array.

1. **In a dual-controller configuration where both controllers have the same version number (such as 4.15C and 4.15E), power on the array and wait a minimum of 10 minutes for firmware cross-load to occur.**
2. **In a dual-controller configuration where the controller modules have different firmware versions (such as 3.25 and 3.66), perform the following steps:**

a. **Power OFF the array.**

b. **Remove the 3.66 controller module. See Section 8.3.1, "Removing a SCSI Controller Module" on page 8-6 for instructions.**

c. **Power up the array with the 3.25 controller module still in the array and allow a few minutes to complete the initialization.**

d. **Confirm that controller version 3.25 is active by entering one of the following commands.**

- Using the serial port connection to the firmware application, from the RAID firmware Main Menu, choose "view system Information" and check the Firmware Version number.
- Enter the following CLI command.

```
sccli> show inquiry
```

The firmware version is the Revision number.

e. **Re-insert the 3.66 controller module. See Section 8.3.2, "Installing a SCSI Controller Module" on page 8-6 for instructions.**

f. **Wait a minimum of 10 minutes for the firmware cross-load to be completed.**

Caution – If the newly installed controller is removed for *any* reason during the period when the status LED is amber (for 10 minutes or more), the controller can be rendered inoperable and must be returned for repair.

3. **Confirm that the secondary controller is active on the array by entering one of the following commands.**

- Using the serial port connection to the firmware application, from the RAID firmware Main Menu, choose "view and edit Peripheral devices → View Peripheral Device Status."

  The `Redundant Controller: Enabled` status indicates an initialized secondary redundant controller.

- Enter the following CLI command.

```
sccli> show redundancy-mode
```

The `Redundancy Status: Enabled` indicates an initialized secondary redundant controller.

8.4 Converting a Dual-Controller Array to a Single-Controller Array

If one controller fails in a dual-controller configuration, you might want to run a single controller for an extended period of time so that the array does not display as degraded.

For instructions on converting a dual-controller configuration to a single-controller configuration, refer to the section titled "To Convert a Dual Controller Array to a Single Controller Array" in the *Sun StorEdge 3000 Family Configuration Service User's Guide*.

8.5 Converting a Single-Controller Array to a Dual-Controller Array

---

Note – SCSI single-controller arrays ship with a blanking panel covering the secondary controller slot. This must be removed in order to install a secondary controller.

---

1. **Keep the array powered on and make sure that the connected hosts are inactive.**
2. **Turn the thumbscrews on the left and right sides of the blanking panel and remove it.**
3. **Gently slide the new controller module into the array.**

Caution – Be sure that the module is properly inserted in the guide rails of the array and that you keep the power on.

---

   a. **Insert the controller FRU into the slot, and push forward until you begin to feel resistance as the connecting pins engage.**
   b. **Push the controller FRU until the connecting pins are fully seated and the RAID controller fits flush against the back plate of the RAID array.**

      Failure to insert the controller carefully as described above can cause one of the following problems:

- The original controller might reset, causing both controllers to go offline, or the new controller might become primary and the original controller might become secondary which can cause the controllers to go offline. **Recovery:** Wait until both RAID controllers initialize and come up in redundant mode with no intervention required.
- If the controller status LED is blinking green on both controllers, then both controllers are primary controllers. **Recovery:** Take out the new controller and reinsert it, carefully following the instructions above. If this does not remedy the problem, power-cycle the array.

4. **Turn the thumbscrews on the left and right sides of the controller module clockwise until they are finger-tight to secure the module and to make the module's front panel flush with the chassis.**

   To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

   The new controller automatically becomes the secondary controller.

   When the new controller FRU is installed, the controller status LED will remain amber until the controllers complete the redundant controller process, which can take more than 10 minutes. The same firmware versions must be installed on both controllers for proper redundant-controller operation.

   The redundant-controller process automatically cross-loads the firmware version of the newly installed controller FRU to match the firmware version of the other running controller. For example, if the running controller has firmware 4.12B and the new controller has 4.15, the new controller will be cross-loaded with the 4.12B firmware of the running controller. To monitor this process, see Section 8.3.3, "Monitoring the Automatic Firmware Update for a Recently Installed Controller FRU" on page 8-8.

Caution – Wait a minimum of 10 minutes for the firmware cross-load to be completed. If the newly installed controller is removed for *any* reason during the period when the status LED is amber (for 10 minutes or more), the controller can be rendered inoperable and must be returned for repair.

5. **If you want the most current version of firmware on your controllers, download the latest firmware patch as described in the release notes for your array.**

6. **Set up the host channels for the new controller module.**

   For host channel set up information, refer to the "Connecting Your Array" chapter in the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array.

Caution – You must set the hosts to the correct host channels on the controller module or your configuration will not work correctly.

8.6 SCSI Controller Replacement for a Single-Controller Array

To replace a SCSI controller module in a single-controller configuration, perform the following steps.

1. **If possible, make a record of the firmware version and configuration settings before replacing the controller.**

   a. **Use the** `show configuration` **CLI command to output the configuration settings to a file. Refer to the** *Sun StorEdge 3000 Family CLI User's Guide* **for more information.**

   b. **Save NVRAM configuration settings to disk.**

      From the RAID firmware Main Menu choose "system Functions → Controller maintenance → Save nvram to disks," and choose Yes to save the contents of NVRAM to disk.

   c. **Record the Controller Unique Identifier which combines the serial number and MAC address for each chassis and is used for network connections.**

      From the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters → Controller Unique Identifier <hex>."

2. **Remove the old controller.**

   a. **Keep the array powered on and make sure that the connected hosts are inactive.**

   b. **Remove all cables from the controller module.**

   c. **Turn the thumbscrews on the left and right sides of the controller module counterclockwise until the thumbscrews are disengaged from the chassis.**

   d. **Hold the thumbscrews, and carefully pull out the controller module.**

3. **Insert the replacement controller.**

   a. **Keep the array powered on.**

   b. **Insert the controller FRU into the slot, and push forward until you begin to feel resistance as the connecting pins engage.**

   c. **Push the controller FRU until the connecting pins are fully seated and the RAID controller fits flush against the back plate of the RAID array.**

Caution – Be sure that the module is properly inserted into the guide rails of the array.

d. Turn the thumbscrews on the left and right sides of the controller module clockwise until they are finger-tight, to secure the module and to make the module's front panel flush with the chassis.

To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

4. Reconnect the original cables to the new controller module.

5. Download the desired firmware version from SunSolve.

Note – Firmware version 3.66 is a special bridge firmware that allows cross-loading from 3.25 or 4.1x firmware modules in a dual-controller configuration. In a single-controller configuration, you must download the latest released firmware version 3.25 or 4.1x into the new controller after installing it.

a. To downgrade from firmware 3.66 to firmware 3.25, follow the instructions in Section 8.6.1, "Downgrading From Controller Firmware Version 3.66 to 3.25" on page 8-15.

b. To upgrade from firmware 3.66 to firmware 4.1x, refer to the patch README file supplied with the firmware.

6. Confirm that the "Controller Unique Identifier" parameter is set to the value recorded in Step 1c.

a. From the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters → Controller Unique Identifier <hex>."

b. If the "Controller Unique Identifier" is not set to the value recorded in step 1c, type the value 0 (to automatically read the chassis serial number from the midplane) or type the hex value for the original serial number of the chassis (used when the midplane has been replaced).

The Controller Unique Identifier is used to create Ethernet MAC addresses and worldwide names. The value 0 is immediately replaced with the hex value of the chassis serial number. A nonzero value should be specified only if the chassis has been replaced, but the original chassis serial number must be retained; this feature is especially important in a Sun Cluster environment, to maintain the same disk device names in a cluster.

c. To implement the revised configuration settings, choose "system Functions → Reset controller" from the RAID firmware Main Menu, then choose Yes to confirm.

7. **If the Sun StorEdge Configuration Service agent was stopped, restart it.**
   - On Solaris and other UNIX systems, use the following command:

```
# /etc/init.d/ssagent start
```

   - On Microsoft Windows systems, use the "Services" utility to start the agent.

     If other software such as StorADE was stopped, restart it following the procedures in the documentation for that software.

8.6.1 Downgrading From Controller Firmware Version 3.66 to 3.25

If you have a 3.66 SCSI replacement controller module for a single-controller configuration (see TABLE 8-1 for controller part numbers), you must downgrade the controller firmware to the released 3.25 firmware version or upgrade to a released 4.1x firmware version.

The 3.25 firmware works with the latest SAF-TE, PLD, and software versions. There is no need to downgrade any of these components if you downgrade the controller version. For instance, CLI version 2.0 is compatible with controller version 3.27. CLI 1.6.2 can be used to downgrade to 3.25 controller firmware but cannot be used to upgrade to 4.1x controller firmware.

The CLI `download controller-firmware` command restores factory defaults with downgrades and does not restore:

- Controller IP address – You must have a serial connection to restore the IP address, and the serial connection must be set to 38400.
- Net mask, gateway settings and baud rate for the serial port
- Customized parameter settings – Record all custom settings prior to the downgrade. The CLI show configuration command does not include all firmware parameters. Be sure to record settings that are in the firmware only, namely sector/head/cylinder parameters and host LUN filter parameters.

1. **Change your working directory to the directory in which the patch was unpacked and confirm that the `SUN325W-3310.bin` file is present using the `ls` command.**
2. **Invoke the Sun StorEdge CLI.**
3. **Verify that you are running CLI version 1.6.2 or 2.*x* with the `version` command.**

4. **Verify the product and revision of the array by typing the following command:**

```
sccli> show inquiry
```

Confirm that the correct product name is displayed. Otherwise, this patch does not apply. Select a different device or discontinue installation of this patch. If the firmware version reported is 3.66, continue with Step 5.

5. **If feasible, save the configuration in a separate location.**

If you are unable to restore the 3.25 configuration, you can reference this file.

- At the `sccli>` command prompt, type the following command:

```
sccli> show configuration filename.txt
```

where *filename.txt* is a text file, or

```
sccli> show configuration --xml filename.xml
```

where *filename.xml* is an xml file.

Note – These commands may take several minutes to complete.

---

6. **Stop all I/O to the array before beginning the controller firmware downgrade and unmount any filesystems or volumes mounted from the array.**

7. **At the `sccli>` prompt, type:**

```
sccli> download controller-firmware -r filename
```

where *filename* is `SUN325W-3310.bin` for the Sun StorEdge 3310 SCSI array.

Note – Disregard the CLI message that a script is available to automate the download; the script is only for upgrades.

The `download controller-firmware` command will display messages indicating that it is downloading the firmware, programming the controller's flash memory, and “engaging” the new firmware. Wait until the `sccli>` prompt appears again before proceeding. This might take 10 minutes or more.

Caution – DO NOT POWER OFF the array or remove a controller FRU within 10 minutes of performing a controller firmware upgrade, or the controller may be rendered inoperable.

8. **To re-establish communication with the array, use the serial connection to restore the IP address, netmask, and gateway.**

9. **To complete the downgrade, access the CLI and enter the following commands:**

```
sccli> reset nvram
sccli> reset controller
```

10. **To re-establish communication with the array, use the serial connection to restore the IP address, netmask, and gateway.**

11. **Verify the firmware revision of the array by typing the following command:**

```
sccli> show inquiry
```

Confirm that the firmware revision is now reported as `325W` for the SCSI array.

12. **Reconfigure your array to the desired configuration.**

a. If you saved a 3.25 configuration file to restore, type:

```
sccli> download nvram filename
```

where *filename* is the name of the file that contains the configuration.

b. Otherwise, configure the array using the CLI or the firmware application.

Caution – Do not restore a 4.1x configuration on a 3.25 controller. This may cause data loss.

13. **Confirm that the Controller Unique Identifier parameter value is correct.**

From the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters → Controller Unique Identifier <hex>."

14. **If the "Controller Unique Identifier" is not set correctly, perform the following steps.**

a. Type the value 0 (to automatically read the chassis serial number from the midplane) or type the hex value for the original serial number of the chassis (used when the midplane has been replaced).

The Controller Unique Identifier is used to create Ethernet MAC addresses and worldwide names. The value 0 is immediately replaced with the hex value of the chassis serial number. A nonzero value should be specified only if the chassis has been replaced, but the original chassis serial number must be retained; this feature is especially important in a Sun Cluster environment to maintain the same disk device names in a cluster.

Caution – If the "Controller Unique Identifier" parameter has the wrong value, network connections will not work correctly and the worldwide name will be incorrect which will cause problems accessing the array.

b. To implement the revised configuration settings, choose "system Functions → Reset controller" from the RAID firmware Main Menu, then choose Yes to confirm.

15. If the Sun StorEdge Configuration Service agent was stopped, restart it.

- On Solaris and other UNIX systems, use the following command:

```
# /etc/init.d/ssagent start
```

- On Microsoft Windows systems, use the "Services" utility to stop the agent.

If other software such as StorADE was stopped, restart it following the procedures in the documentation for that software.

CHAPTER 9

FC and SATA Module FRUs

This chapter provides instructions for removing and installing field-replaceable units (FRUs) in Sun StorEdge 3510 FC and Sun StorEdge 3511 SATA arrays.

Topics covered in this chapter are:

- Section 9.1, "Replacing I/O Expansion Modules" on page 9-2
  - Section 9.1.1, "Removing the I/O Expansion Module" on page 9-2
  - Section 9.1.2, "Installing the I/O Expansion Module" on page 9-2
- Section 9.2, "Installing Small Form-Factor Pluggable Transceivers" on page 9-3
- Section 9.3, "Installing a RAID/Expansion Chassis FRU" on page 9-5
- Section 9.4, "Converting an FC JBOD Into an FC RAID Array" on page 9-8
  - Section 9.4.1, "Managing an FC RAID Array Using Sun StorEdge Configuration Service" on page 9-15
  - Section 9.4.2, "Creating a Dual-Controller RAID Array" on page 9-16
- Section 9.5, "Replacing the ID Switch Module" on page 9-17
  - Section 9.5.1, "Reviewing the Parts and Tools" on page 9-17
  - Section 9.5.2, "Removing the Front Bezel and Left Ear Cap" on page 9-18
  - Section 9.5.3, "Removing the ID Switch Module" on page 9-19
  - Section 9.5.4, "Installing a New ID Switch Module" on page 9-21
  - Section 9.5.5, "Replacing the Ear Cap and Front Bezel" on page 9-22

9.1 Replacing I/O Expansion Modules

Be sure to follow Section 1.2, "Static Electricity Precautions" on page 1-8.

Caution – When you replace an I/O expansion module, the connected hosts must be inactive during the replacement procedure.

9.1.1 Removing the I/O Expansion Module

Keep the array powered on, and be sure that the connected hosts are inactive during this procedure.

1. **Turn the thumbscrews on the left and right sides of an I/O expansion module counterclockwise until the thumbscrews are disengaged from the chassis.**
2. **Grasp the handle and pull out the I/O expansion module.**

9.1.2 Installing the I/O Expansion Module

Keep the array powered on, and be sure that the connected hosts are inactive during this procedure.

1. **Slide the I/O expansion module into the chassis until the module is firmly seated in the backplane, and the module's front panel is flush with the chassis.**

Caution – Be sure that the I/O expansion module is properly inserted in the guide rails of the array.

2. **Turn the thumbscrews on the left and right sides of the I/O expansion module clockwise until the thumbscrews are finger-tight to secure the module.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

When you power on your array, if you hear an audible alarm and see a blinking amber Event light on the front of your array, the SES firmware or its associated PLD code in the new controller has a version that is different from the code in the other

I/O controller in your array. To solve this mismatch, see Section 6.3.4, “SES Firmware Update Sometimes Required with I/O Controller Module Replacements” on page 6-10.

Note – The beep code that identifies an SES or PLD firmware mismatch is the repeating Morse code letter “R” (dot dash dot).

9.2 Installing Small Form-Factor Pluggable Transceivers

Fibre Channel arrays use small form-factor (SFP) transceivers to attach the array to hosts and expansion units.

Sun StorEdge 3510 FC array I/O controller modules have six SFP ports, as shown in the lower row of ports in FIGURE 9-1. These ports are labeled FC0 through FC5. Sun StorEdge 3511 SATA array I/O controller modules have eight SFP ports, as shown in FIGURE 9-2. SFP ports on the Sun StorEdge 3511 SATA array are also labeled FC0 through FC5.

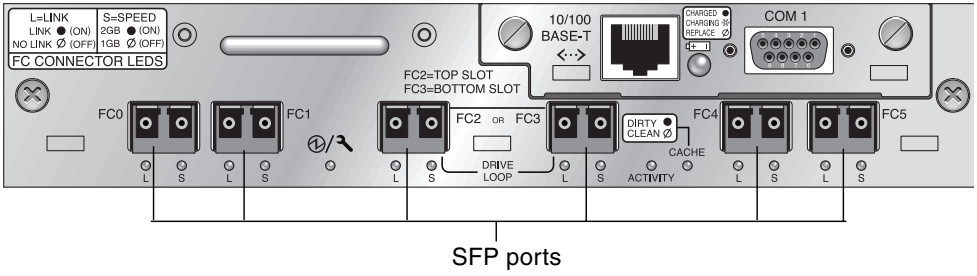


FIGURE 9-1 Six SFP Ports on a Sun StorEdge 3510 FC Array I/O Controller Module

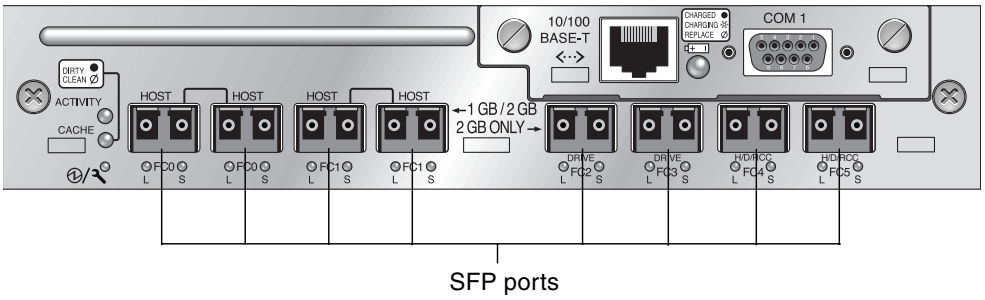


FIGURE 9-2 Eight SFP Ports on a Sun StorEdge 3511 SATA Array I/O Controller Module

Each Sun StorEdge 3510 FC I/O expansion module has two SFP ports. Sun StorEdge 3511 SATA I/O expansion modules have four SFP ports. On both Sun StorEdge 3510 FC and Sun StorEdge 3511 SATA I/O expansion modules, these ports are labeled Loop A or Loop B.

To install an SFP in an SFP port:

1. **Slide the SFP into the SFP port until it locks into place.**

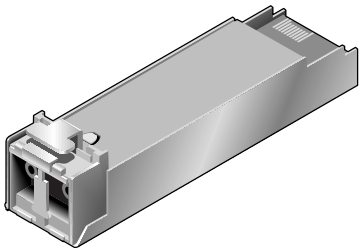


FIGURE 9-3 Typical SFP Used to Connect Cables to SFP Ports

2. **Plug one end of a Fibre Channel cable into the duplex jack at the end of the SFP, as shown in** FIGURE 9-4**.**
3. **Plug the other end of the Fibre Channel cable into a server or into an FC expansion unit.**

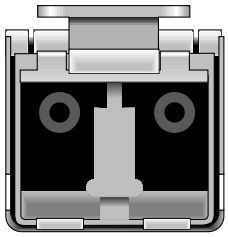


FIGURE 9-4 Duplex Jack at the End of an SFP

Note – To remove an SFP, make sure that no cable is connected to it and then slide it out from the port.

9.3 Installing a RAID/Expansion Chassis FRU

The chassis (box) FRU for the Sun StorEdge 3510 FC and Sun StorEdge 3511 SATA arrays includes a chassis, its drive midplane, and its backplane. This product is ordered to replace a box that has been damaged or whose midplane or backplane has been damaged.

To make a fully functional array, you must add the following parts from the replaced array:

- Drive modules
- Two power supply/fan modules
- One or two JBOD I/O modules (for an expansion unit or JBOD)
- One or two I/O controller modules (for a RAID array)

To install the individual modules, use the replacement instructions provided in this guide.

To configure the array, refer to the installation manual for your array. The installation manuals are located on the Sun StorEdge 3000 Family Documentation CD. Manuals for both the Sun StorEdge 3510 FC and Sun StorEdge 3511 SATA arrays are also located on the product web sites.

To replace the chassis frame of an existing RAID array or expansion unit, perform the following steps.

Caution – Connected hosts must be inactive during this replacement procedure.

Note – Be sure to follow Section 1.2, "Static Electricity Precautions" on page 1-8 for all procedures.

1. **Connect to the firmware application via the serial interface (`tip` for Solaris/Linux) or via `telnet`.**
2. **If the defective array is a RAID array:**
   a. **From the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters."**
   b. **Write down the Controller Unique Identifier (hex) - value.**
3. **If the defective array is a RAID array, stop all I/O activity and shut down the RAID controller:**
   - From the RAID firmware Main Menu, choose "system Functions → Shutdown Controller." Then choose Yes to confirm.
4. **Power off both power supply modules on the defective array.**
5. **Clearly label all FC cables attached to the I/O controller module.**
6. **Write down the defective array's cabling configuration.**
7. **Remove all FC cables attached to the I/O controller module.**
8. **If the defective array is a RAID array, remove all serial, Ethernet, and power cables connected to the I/O controller modules.**
9. **Label each disk drive with its disk slot position in the array.**
10. **Remove the I/O controller modules, power supply modules, and disk drives from the defective array.**

    Make sure you place the component on a flat surface that is not susceptible to electrostatic discharge.
11. **Remove the defective chassis.**
12. **Obtain the replacement chassis.**
13. **Reinstall all previously removed FRUs in their original positions in the replacement chassis.**
14. **Reinstall all FC, serial, Ethernet, and power cables in their original positions.**
15. **Power on both power supply modules.**

16. **If the replacement chassis is an expansion unit or JBOD, refer to your installation manual to configure it.**

17. **If the replacement chassis is a RAID array, proceed with the following steps:**

    a. **Connect to the array console menu interface via the serial interface (`tip` for Solaris/Linux) or via `telnet`.**

    b. **From the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters → Controller Unique Identifier (hex)."**

18. **If this array is being used by clustered hosts, or for any other reason its attached hosts require that their Device IDs remain consistent, perform these steps:**

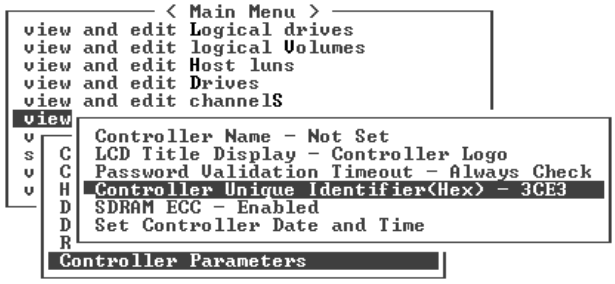
    a. **Set Controller Unique Identifier (hex) to the value you wrote down in Step 2.**

    b. **Reset the RAID Controllers.**

    From the RAID firmware Main Menu, choose "system Functions → Reset controller." Confirm Yes when prompted.

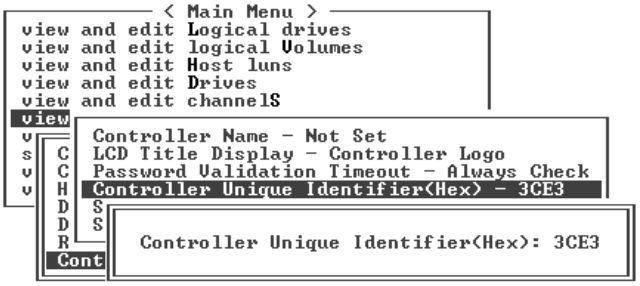
19. **If this array is NOT being used by clustered hosts, perform these steps:**

    a. **On the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters → Controller Unique Identifier <hex>."**


< Main Menu >
view and edit Logical drives
view and edit logical Volumes
view and edit Host luns
view and edit Drives
view and edit channelS
Controller Name - Not Set
LCD Title Display - Controller Logo
Password Validation Timeout - Always Check
Controller Unique Identifier(Hex) - 3CE3
SDRAM ECC - Enabled
Set Controller Date and Time
Controller Parameters

b. Type in the value 0 and press Return (to automatically read the chassis serial number from the midplane).

The value 0 is immediately replaced with the hex value of the chassis serial number.


< Main Menu >
view and edit Logical drives
view and edit logical Volumes
view and edit Host luns
view and edit Drives
view and edit channelS
Controller Name - Not Set
LCD Title Display - Controller Logo
Password Validation Timeout - Always Check
Controller Unique Identifier(Hex) - 3CE3
Controller Unique Identifier(Hex): 3CE3

c. To implement the revised parameter value, on the RAID firmware Main Menu, choose system Functions → Reset controller."

Confirm Yes when prompted.

9.4 Converting an FC JBOD Into an FC RAID Array

You can convert a Sun StorEdge 3510 FC JBOD (or expansion unit) into a single-controller or dual-controller Sun StorEdge 3510 FC RAID array by performing the following procedure.

Note – It is not possible to convert a Sun StorEdge 3310 SCSI JBOD or expansion unit to a Sun StorEdge 3310 SCSI RAID array.

Components required for this conversion are:

- An FC JBOD
- An FC I/O controller module (two modules for a dual-controller array)
- Additional SFPs as needed
- A serial null modem cable for initial configuration of the RAID array
- Ethernet cables for network access (one for each I/O controller module)
- *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array

- *Sun StorEdge 3000 Family Configuration Service User's Guide* (if Configuration Service is used to manage and monitor Sun StorEdge 3000 Family products)

Note – If you do not have the required cables, consult your sales representative to obtain them.

---

1. **If you have data on the JBOD drives, be sure to back up the data to the network or to another array prior to the conversion of the JBOD to a RAID array.**

Caution – The data on the drives of a JBOD will not be accessible after the JBOD is converted to a RAID array. Therefore, it is essential that you back up the JBOD data to another storage device prior to converting the JBOD to a RAID array.

Note – You must use a tool within Solaris, or an external software package to perform the data backup function. The firmware, software, and Sun StorEdge CLI provided with the Sun StorEdge 3510 FC and Sun StorEdge 3511 SATA arrays do not have backup functions for data.

---

2. **If you use Sun StorEdge Configuration Service to monitor your arrays and JBODs, stop the `sscs` daemon and close the console.**

Note – When you disconnect the JBOD from the host, the JBOD drives will appear as failed drives in Sun StorEdge Configuration Service. To remove the failed drive entries, stop the daemon, remove the JBOD, and restart the daemon.

---

3. **To convert the JBOD to a RAID array, power off the JBOD.**
4. **Remove all cables connected to the JBOD I/O expansion modules which will be replaced by I/O controller modules.**
5. **Remove the top I/O expansion module with the following steps.**
   a. **Turn the thumbscrews on the left and right sides of an I/O expansion module counterclockwise until the thumbscrews are disengaged from the chassis.**
   b. **Grasp the handle and pull out the I/O expansion module.**
   c. **To remove an SFP, make sure no cable is connected to it and then slide it out from the port.**

      Each I/O expansion module has one SFP which can be inserted into the new I/O controller module and reused.

6. **Insert the SFP from Step c above into the new I/O controller module.**

   Slide the single end of the SFP into an empty port until it locks into place.

Note – I/O controller module FRUs do not have any SFPs; the SFPs must be ordered separately. The I/O controller module X-Option includes two SFPs, an Ethernet cable, and a serial cable.

In a dual-controller Sun StorEdge 3510 FC array (FIGURE 9-5), the recommended configuration is SFPs plugged into the following ports:

- The upper I/O controller module with SFPs in the FC0, FC2, and FC4 ports
- The lower I/O controller module with SFPs in the FC1, FC3, and FC5 ports

This configuration provides connections to all four host channels as well as to both drive channels, and prevents a single point of failure.

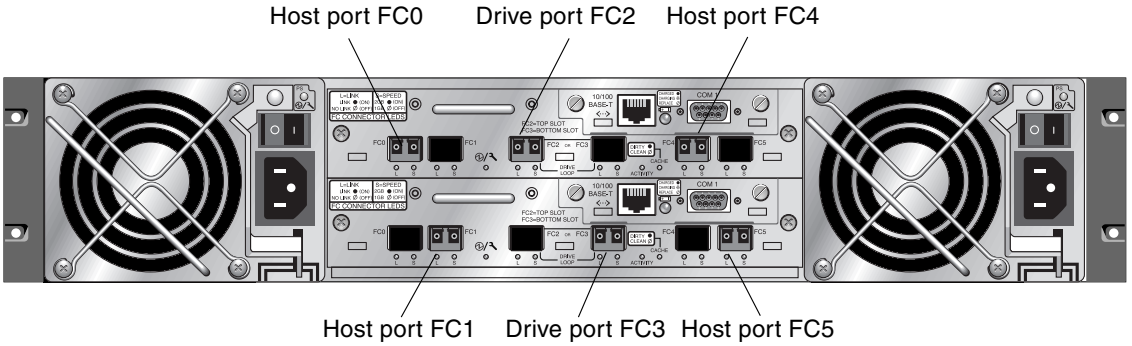


FIGURE 9-5 Recommended Sun StorEdge 3510 FC Array Dual-Controller SFP Placement

In a dual-controller Sun StorEdge 3511 SATA array (FIGURE 9-6), the recommended configuration is SFPs plugged into the following ports:

- The upper I/O controller module with SFPs in the left-most FC0 port, the FC2, and FC4 ports
- The lower I/O controller module with SFPs in the left-most FC1 port, the FC3, and FC5 ports

This configuration provides connections to all four host channels as well as to both drive channels, and prevents a single point of failure.

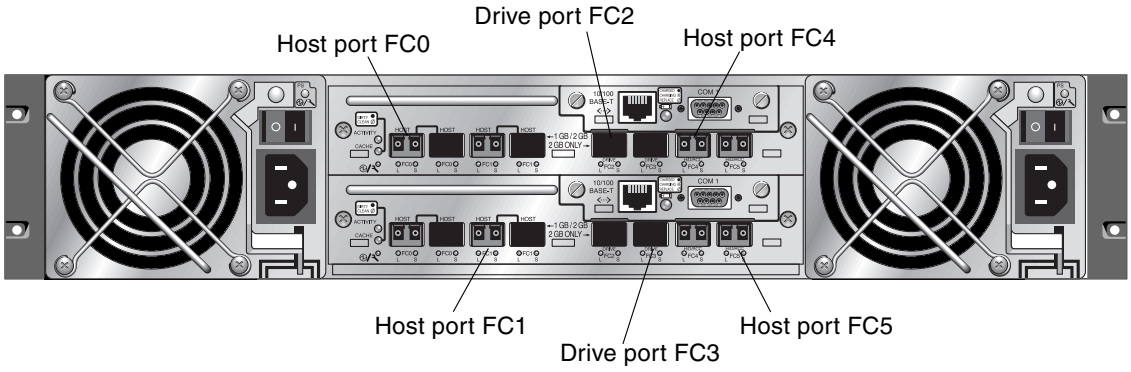


FIGURE 9-6 Recommended Sun StorEdge 3511 SATA Array Dual-Controller SFP Placement

In a single-controller Sun StorEdge 3510 FC array, SFPs are usually plugged into FC0, FC1, FC4, and FC5. No SFPs are plugged into the drive channels. This configuration is appropriate for connecting to up to four hosts or fibre switches, with no connection to expansion units.

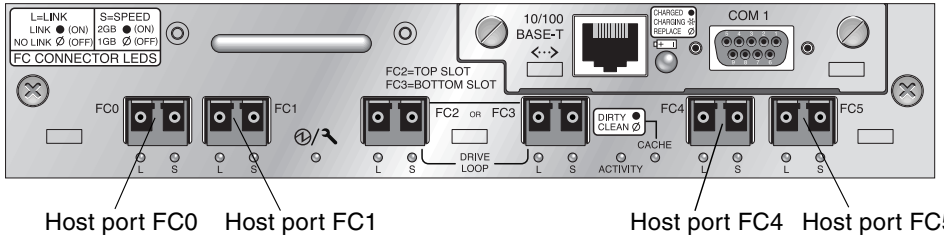


FIGURE 9-7 Sun StorEdge 3510 FC Array Single-Controller SFP Placement

In a single-controller Sun StorEdge 3511 SATA array, SFPs are usually plugged into the left-most port of FC0, the left-most port of FC1, port FC4, and port FC5. No SFPs are plugged into the drive channels. This configuration is appropriate for connecting to up to four hosts or fibre switches, with no connection to expansion units.

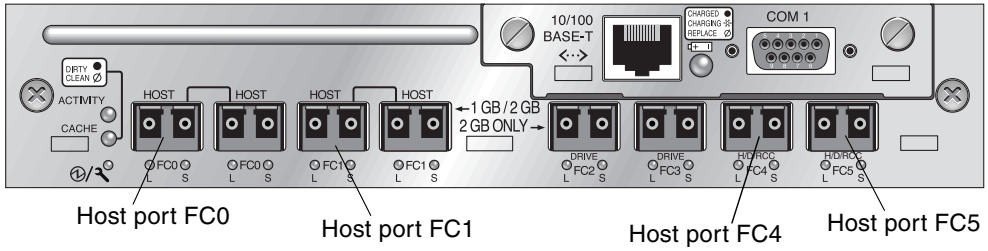


FIGURE 9-8 Sun StorEdge 3511 SATA Array Single-Controller SFP Placement

7. **Insert additional SFPs into the new I/O controller module as needed.**
8. **Install an I/O controller module into the top slot with the following steps.**
   a. **Gently slide the I/O controller module into the unit until it clicks and is seated in the backplane.**

Caution – Be sure that the module is properly inserted in the guide rails of the array.

   b. **Turn the thumbscrews on the left and right sides of the I/O controller module clockwise until they are finger-tight to secure the module and to make the module's front panel flush with the chassis.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

9. **Repeat Step 4 and Step 5 to remove the I/O module in the lower slot and repeat Step 6 through Step 8 to install a second I/O controller module if you want to create a dual-controller RAID array.**
10. **Power on the array.**
11. **Print or locate the** *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* **for the Sun StorEdge 3510 FC and the Sun StorEdge 3511 SATA arrays to use for the remainder of this procedure.**
12. **Connect the new RAID array to a terminal emulation program or workstation through its serial port.**

    For information on how to connect to the serial port, refer to section 4.7, *Configuring a COM Port to Connect to a RAID Array*, in the installation manual.

    On a Solaris system, use the `tip` command to access the array locally.

```
# tip -38400 /dev/ttyn
```

    where *n* is the COM port identifier. For instance, if you have connected the array to the COM port identified as `ttyb`, use this command:

```
# tip -38400 /dev/ttyb
```

    Refresh your screen by holding down the Control key on your keyboard and pressing the letter L key on your keyboard.

13. **Set up an IP address for the chassis.**

    Refer to section 4.8, *Setting an IP Address*, in the installation manual.

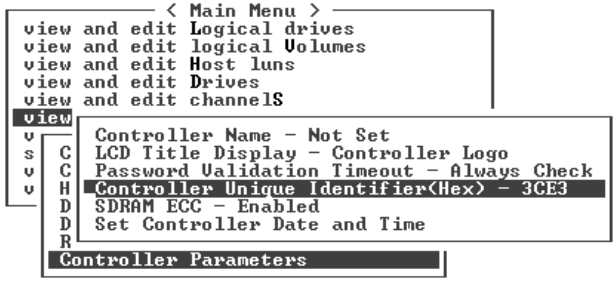
Note – You can access the firmware application program directly through the serial port, or over Ethernet after you have set up the IP address.

    To connect by `telnet` to the chassis and access the firmware application, refer to section 4.9, *Setting Up Out-of-Band Management Over Ethernet*, in the installation manual.

14. **Set the Controller Unique Identifier for each I/O controller module to 0 so that it adopts the chassis serial number with the Reset controller command.**

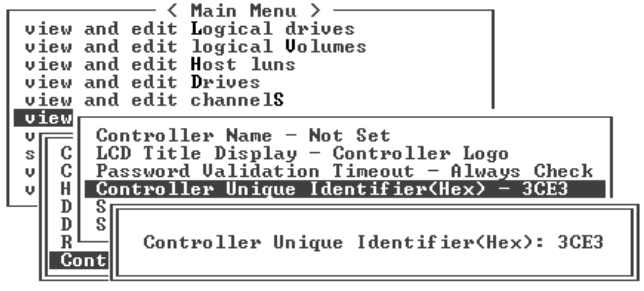
    The Controller Unique Identifier is used to create Ethernet MAC addresses and worldwide names. Perform the following steps to ensure that the Controller Unique Identifier is set to zero.

    a. **From the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters → Controller Unique Identifier <hex>."**


< Main Menu >
view and edit Logical drives
view and edit logical Volumes
view and edit Host luns
view and edit Drives
view and edit channelS
Controller Name - Not Set
LCD Title Display - Controller Logo
Password Validation Timeout - Always Check
Controller Unique Identifier(Hex) - 3CE3
SDRAM ECC - Enabled
Set Controller Date and Time
Controller Parameters

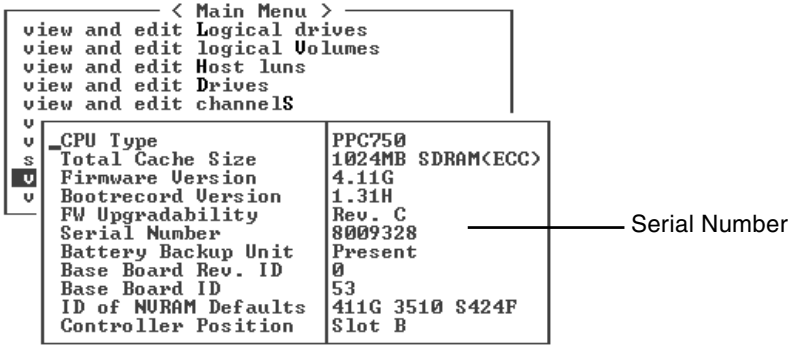
    b. **Type in the value `0` (to automatically read the chassis serial number from the midplane) and press Return.**

       The value 0 is immediately replaced with the hex value of the chassis serial number.


< Main Menu >
view and edit Logical drives
view and edit logical Volumes
view and edit Host luns
view and edit Drives
view and edit channelS
Controller Name - Not Set
LCD Title Display - Controller Logo
Password Validation Timeout - Always Check
Controller Unique Identifier(Hex) - 3CE3
Controller Unique Identifier(Hex): 3CE3

c. **To implement the revised parameter value, on the RAID firmware Main Menu, choose "system Functions → Reset Controller." Confirm Yes when prompted.**

15. **On the RAID firmware Main Menu, choose "view system Information," and record the serial number of the array. You will use this number later.**



16. **For cabling and configuration instructions, refer to the** *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* **for your array.**

    The new RAID array requires new cabling and first-time configuration.

    Each operating system has additional procedures or requirements for seeing a new device. For instructions related to each operating system, refer to the appropriate appendix in the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array.

Note – In some operating systems, you will also have obsolete files or paths associated with the removed JBOD unit; for example in Solaris operating systems, `ses` files are created for each JBOD drive under `/dev/es`. Consult your operating system documentation for information on how to remove or modify appropriate files and paths.

---

17. **After you create RAID logical drives on the new RAID array, restore the data onto the drives.**

Note – You must use a tool within Solaris, or an external software package to perform the data restore function. The firmware, software, and Sun StorEdge CLI provided with the Sun StorEdge 3510 FC and Sun StorEdge 3511 SATA arrays do not have restore functions for data.

9.4.1 Managing an FC RAID Array Using Sun StorEdge Configuration Service

If you plan to use Sun StorEdge Configuration Service to manage and monitor the RAID array, perform the following additional steps.

Note – For first time configuration of a new RAID array, refer to the *Sun StorEdge 3000 Family RAID Firmware User's Guide*.

---

1. **Restart the Sun StorEdge Configuration Service agent and the console.**
2. **From the Sun StorEdge Configuration Service main window in the console, click View → Agent Options Management, and uncheck the box labeled Enable JBOD support.**

   You must disable the JBOD support temporarily in order to remove the old JBOD drive assignments.
3. **Click View → View Server.**
4. **Double-click on the server which had the JBOD array connected to it. Click the Probe button.**

   The JBOD connections are removed now.
5. **Click Array Administration → Controller Assignment.**

   The Assign Server to Manage a RAID Controller window is displayed.
6. **Check that the RAID array serial number recorded in Step 15 is displayed.**

   If the serial number is not displayed, check the operating system information in the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array and your operating system documentation to complete the configuration. You will need to stop and restart the Sun StorEdge Configuration Service agent and console to see the revised configuration.
7. **Select a server from the "Server to manage this controller" list and click Apply.**

   This enables the selected server to manage an array controller. It also disables all other servers listed from managing the same array.
8. **To provide monitoring of other JBODs, click View → Agent Options Management, and check the box labeled Enable JBOD support.**

   Your initial configuration of the RAID array is now complete. Refer to the *Sun StorEdge Configuration Service User's Guide* for additional information.

9.4.2 Creating a Dual-Controller RAID Array

If you are creating a dual-controller RAID array, perform the following steps with the firmware application, to ensure compatibility.

Note – For first time configuration of a new RAID array, refer to the *Sun StorEdge 3000 Family RAID Firmware User's Guide*.

---

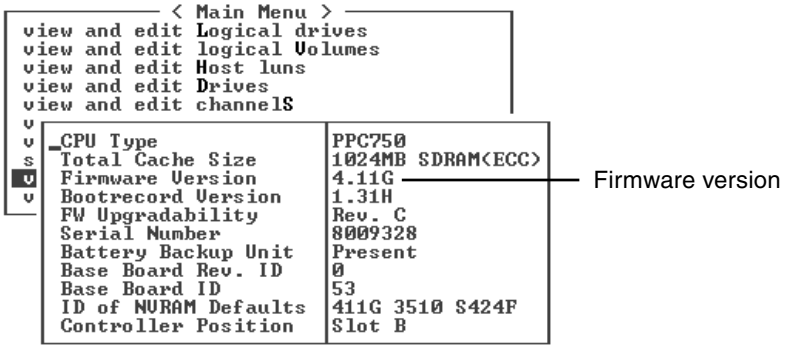
1. **To check the controller firmware version of each module:**

   a. **Remove one I/O controller module so that only one I/O controller module remains in the array.**

   b. **Maintain a serial port connection to a terminal or workstation as described in Step 12.**

   c. **In the firmware application, choose "view system Information" and record the Firmware Version.**

   d. **Insert the second I/O controller module, remove the first module, and choose "view system Information" to record the Firmware Version of the second module.**



   e. **To check that you have the latest firmware, go to:**

      http://sunsolve.sun.com

      and select Patch Portal. Browse in the Sun Alert Patch Report, or check the release notes for your array for firmware patch information.

2. **Check the number on each I/O controller module faceplate where there is a four-digit number such as** `03/50` **or** `04/50`**.**

   Both I/O controller modules must have the same first two digits which represent a SES/PLD firmware level in the module. If the two modules have two different numbers, for example 03 and 04, you must upgrade one I/O controller module to the higher level or both modules to the latest SES/PLD level. For more information, see Section 6.3.4, "SES Firmware Update Sometimes Required with I/O Controller Module Replacements" on page 6-10.

3. **If the firmware versions of the two I/O controller modules do not match, download the latest firmware to each I/O controller module to ensure that they have the latest firmware and the same firmware.**

   To download new versions of controller firmware, disk drive firmware, or SES/PLD firmware, use one of the following tools and check the release notes for your array, or Sun Solve for the latest firmware patch:

   - Sun StorEdge 3000 Family CLI (with an in-band connection, for Linux and Windows hosts, and for servers running the Solaris operating system)
   - Sun StorEdge 3000 Family Configuration Service program (with an in-band connection, for Solaris and Windows hosts)
   - Firmware application (only for downloading controller firmware from a Windows host with an out-of-band serial port connection)

9.5 Replacing the ID Switch Module

This procedure replaces a defective FC or SATA switch module with a new switch module.

9.5.1 Reviewing the Parts and Tools

The following parts are included in the ID switch module replacement kit:

- one ID switch board
- two #4-40 x 1/4-inch flathead, magnetic SS, Phillips, 100 degree screws

The following tool is required to complete this procedure:

- Phillips No. 1 screwdriver

9.5.2 Removing the Front Bezel and Left Ear Cap

1. **Power off both RAID controllers.**
2. **If attached, unlock the front bezel cover with the provided key.**
3. **Grasp the front bezel cover on both sides and pull it forward and then down.**
4. **Press the right bezel arm (hinge) toward the left side to release it from the chassis hole.**

   The left bezel arm also disengages.
5. **Note the location of the chassis bezel holes on each ear.**
6. **Remove the plastic cap from the left ear of the array.**
   a. **Squeeze both sides of the cap at the top and the bottom.**
   b. **Turn the cap toward the center of the array until it disengages and pull it free.**

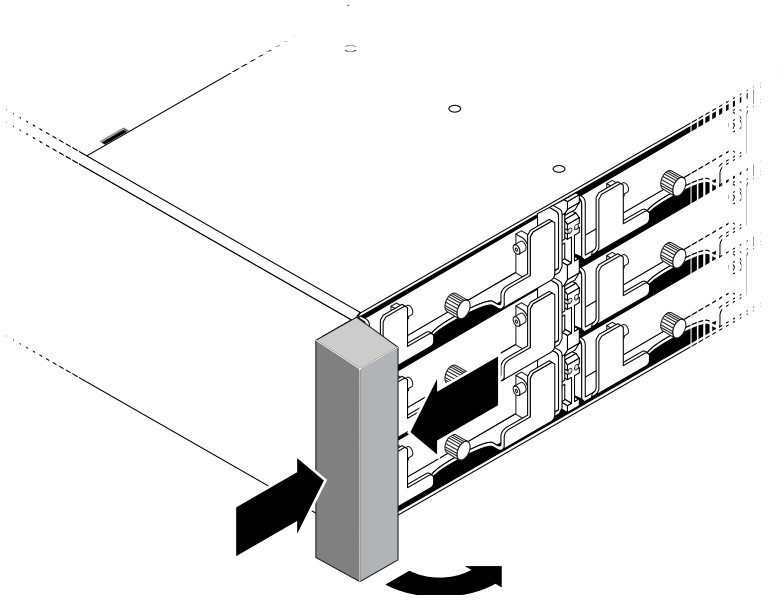


FIGURE 9-9 Removing the Left Ear Cap

9.5.3 Removing the ID Switch Module

Be sure to follow Section 1.2, “Static Electricity Precautions” on page 1-8.

1. **Record the ID switch setting on the switch module currently attached to the chassis.**

   You must set the same switch setting on the new switch module before you install it.

2. **Remove the one panhead screw (B in FIGURE 9-10) attaching the switch module to the chassis.**

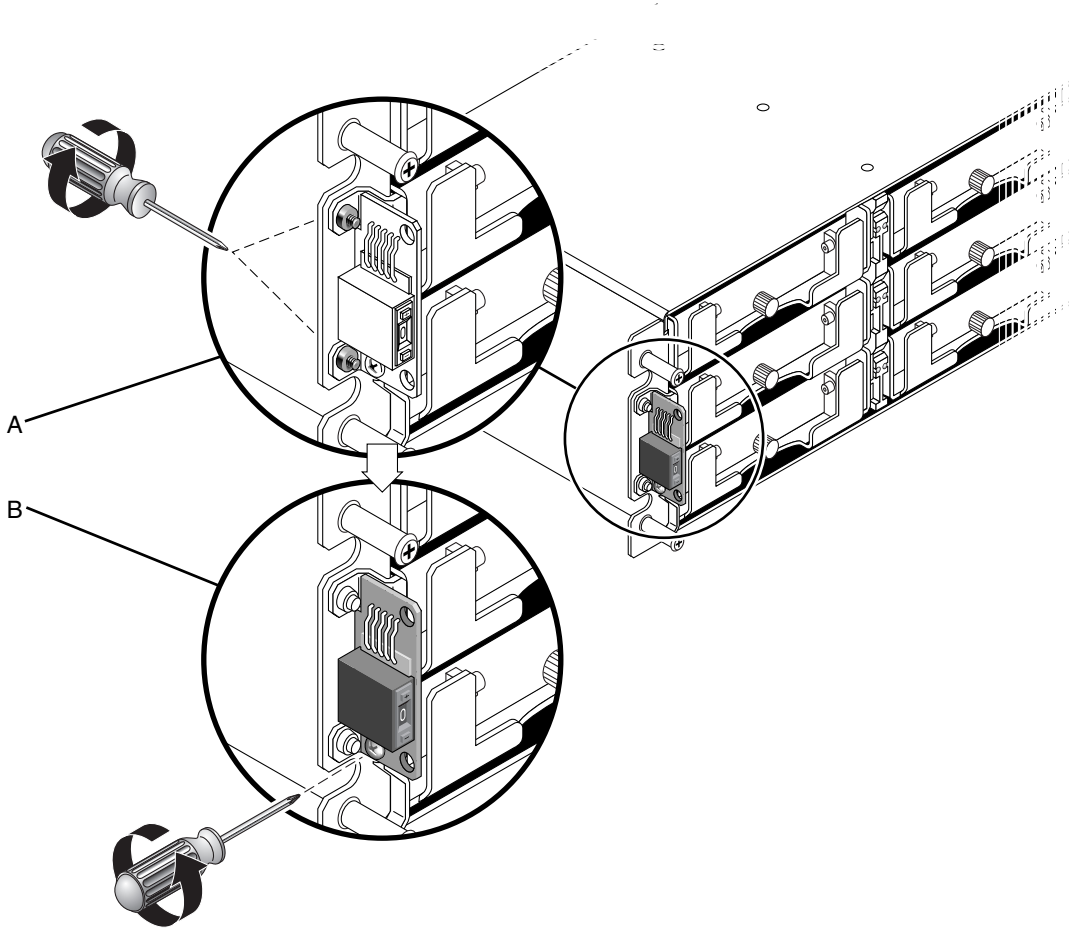


FIGURE 9-10 Detaching the ID Switch Module From the Chassis

Note – If the lower bracket screw obstructs the ID switch module screw (B in FIGURE 9-10), the chassis will have to be removed from the rack (if it is a rackmounted array) or the case (if it is a tabletop array) to gain access to the bracket screws (A in FIGURE 9-10) and remove them. Two #4-40 x 1/4-inch flathead screws are provided to replace the bracket screws, should they become damaged when removed. For details on removing the cover from a tabletop array, see Section 2.4.2, "Converting a Tabletop Array to a Rack-Ready Array" on page 2-19.

3. **Carefully pull the switch module out a short distance from the chassis.**

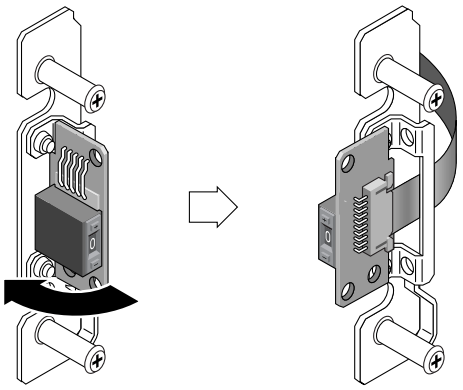


FIGURE 9-11 Removing the ID Switch Module

4. **Detach the switch module from the ribbon cable by pulling out the tiny cable lock drawer and sliding the switch module free.**

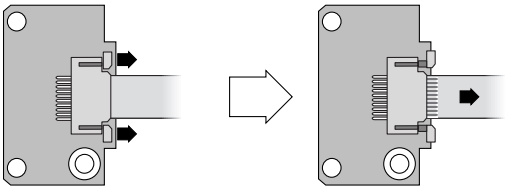


FIGURE 9-12 Disengaging the Ribbon Cable From the Cable Lock Drawer

9.5.4 Installing a New ID Switch Module

1. **Before installing the new switch module, set the ID switch on the new module to the same switch setting recorded in Step 1 in Section 9.5.3, "Removing the ID Switch Module" on page 9-19.**

Caution – Be sure that the ID switch has the correct setting. If it does not have the correct setting, the configuration might be invalid.

2. **Pull out the cable lock drawer on the new switch module.**
3. **Insert the ribbon cable into the cable lock drawer and close the cable lock drawer to reconnect the cable to the switch module.**

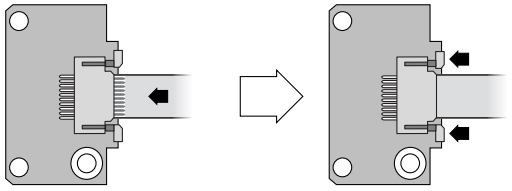


FIGURE 9-13 Inserting the Ribbon Cable Into the Cable Lock Drawer

Note – The blue side of the ribbon cable must face towards the switch module and the ribbon contact area must be completely inserted into the switch module before the lock drawer is closed.

4. **Insert the panhead screw through the switch module and reattach the module to the chassis.**

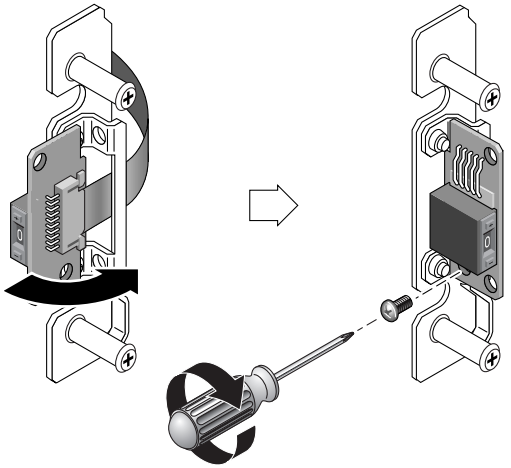


FIGURE 9-14 Installing the New ID Switch Module

5. **If the flathead screws (A in FIGURE 9-10) were removed, reattach these screws through the chassis flange into the bracket.**

   Replacement screws are provided in the ship kit in case the original screws were damaged during removal.

6. **If it was removed in Step 2 in Section 6.6.3, restore the chassis to its case or rack.**

7. **Confirm that the switch setting is still the same value as that recorded in Step 1 in Section 9.5.3, "Removing the ID Switch Module" on page 9-19.**

9.5.5 Replacing the Ear Cap and Front Bezel

1. **Push the top and bottom of the ear cap onto the ear, pressing in on the top side toward the center of the array until the ear cap snaps into place.**

2. **Insert the bezel arms into the chassis holes.**

3. **Lift the bezel into position and press it onto the front of the chassis until it is flush with the front.**

4. **Lock the bezel in the closed position with the keys.**

5. **Remove the keys if they were not initially inserted into the chassis.**

6. **Power on both power supply modules.**

CHAPTER 10

SCSI Module FRUs

This chapter provides instructions for removing and installing field-replaceable units (FRUs) in Sun StorEdge 3310 SCSI arrays and Sun StorEdge 3320 SCSI arrays.

Topics covered in this chapter are:

- Section 10.1, "Replacing SCSI I/O Modules" on page 10-2
  - Section 10.1.1, "Installing Gaskets If Needed" on page 10-2
  - Section 10.1.2, "Removing the SCSI I/O Module" on page 10-2
  - Section 10.1.3, "Installing a SCSI I/O Module" on page 10-3
- Section 10.2, "Replacing the SCSI Terminator Module" on page 10-3
  - Section 10.2.1, "Removing the SCSI Terminator Module" on page 10-4
  - Section 10.2.2, "Installing a Terminator Module" on page 10-4
- Section 10.3, "Replacing the EMU Module" on page 10-5
  - Section 10.3.1, "Removing an EMU Module" on page 10-6
  - Section 10.3.2, "Installing an EMU Module" on page 10-6
- Section 10.4, "Installing a RAID/Expansion Chassis FRU" on page 10-7
- Section 10.5, "Special JBOD Usage With External Terminators" on page 10-10
  - Section 10.5.1, "External Terminators for Special Split-Bus JBOD Maintenance" on page 10-10
  - Section 10.5.2, "Older JBOD Split-Bus Configurations" on page 10-12
- Section 10.6, "Installing a Filler Panel on a SCSI Array" on page 10-15

Note – Be sure to follow Section 1.2, "Static Electricity Precautions" on page 1-8 for all procedures.

10.1 Replacing SCSI I/O Modules

Be sure to follow Section 1.2, "Static Electricity Precautions" on page 1-8.

10.1.1 Installing Gaskets If Needed

Prior to installing the I/O module, check to see if there is a 1/4-inch thin gasket on the top inside edge of the I/O module slot on the chassis.

If the gasket is on that edge, do not use the gasket provided with the I/O module FRU.

If there is no gasket on the top inside edge of the I/O module slot, install the enclosed gasket as follows:

1. **Remove the plastic white backing on the back of the gasket.**
2. **Attach the adhesive side of the gasket to the top inside edge of the I/O module faceplate. This will look identical to the gasket already on the bottom inside edge of the I/O module faceplate.**

10.1.2 Removing the SCSI I/O Module

Caution – Connected hosts must be inactive during this replacement procedure.

1. **Write down the cabling configuration for the SCSI I/O module and expansion unit connections so that you can reconnect the cables correctly with the new SCSI I/O module.**
2. **Power off both power supply modules on the array.**
3. **Remove all cables from the SCSI I/O module.**
4. **Write down the bus configuration (split-bus or single-bus configuration).**
5. **Ensure that all SCSI cables attached to the I/O module are labeled clearly, then remove all SCSI cables attached to the I/O module.**

Caution – The I/O module offers resistance when you remove it from the chassis backplane. When unseating the module from the chassis, check that you do not bend backwards the ERROR LED mounted on the module.

6. **Turn the thumbscrews on the left and right sides of an I/O module counterclockwise until the thumbscrews are disengaged from the chassis.**
7. **Hold the thumbscrews, and using a slight downward pressure, pull evenly on the screws to disengage the I/O module.**

10.1.3 Installing a SCSI I/O Module

1. **With the power still off, slide the I/O module into the chassis far enough to engage the thumbscrews.**

Caution – Be sure that the I/O module is properly inserted into the guide rails.

2. **Turn the thumbscrews on the left and right sides of the I/O module clockwise as tight as possible without using a screwdriver. Then push firmly with a single firm, two-handed push which should move the module about 1 cm.**
3. **Tighten the thumbscrews again. Then push firmly again with a single firm, two-handed push. Tighten the thumbscrews again until finger-tight.**

Note – An improperly seated I/O module commonly causes SCSI channel errors.

4. **Reinstall all SCSI cables in their original positions.**

Caution – You must connect the hosts to the correct host channels on the SCSI I/O module or your configuration will not work correctly.

5. **Power on both power supply modules.**

10.2 Replacing the SCSI Terminator Module

Be sure to follow Section 1.2, “Static Electricity Precautions” on page 1-8.

10.2.1 Removing the SCSI Terminator Module

1. **Power off both power supply modules on the array.**

   Although the terminator module is technically hot-swappable, most users power off the array because the procedure requires that you will be removing and reinserting three modules during the procedure.

Caution – Connected hosts must be inactive during this replacement procedure.

2. **Remove all serial and Ethernet cables connected to the controller modules.**
3. **Remove both controller modules:**
   a. **Turn the thumbscrews on the left and right sides of each controller module counterclockwise until the thumbscrews are disengaged from the chassis.**
   b. **Hold the thumbscrews and pull out the controller module.**
4. **Hold the terminator module by the front edges, and pull it out of the chassis.**

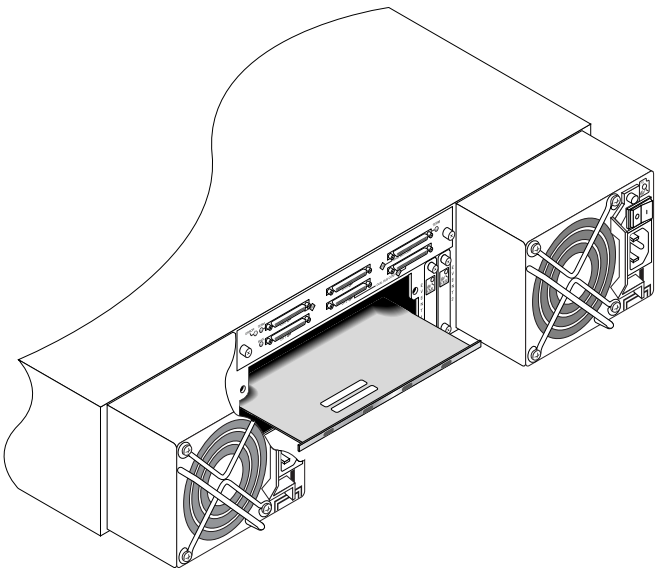


FIGURE 10-1 The Terminator Module Partially Pulled Out of the Chassis

10.2.2 Installing a Terminator Module

1. **Keep the array powered off.**

2. **Slide the terminator module into the chassis until it is seated in the backplane.**

Caution – Be sure that the terminator module is properly inserted into the guide rails of the array.

3. **Reinstall both controller modules:**

   a. **Gently slide each controller module into the unit until the module is seated in the backplane.**

   b. **Turn the thumbscrews on the left and right side of the controller module clockwise until they are finger-tight, to secure the module.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

4. **Reinstall the serial and Ethernet cables in their original positions.**

5. **Power on both power supply modules of the array.**

10.3 Replacing the EMU Module

Be sure to follow Section 1.2, “Static Electricity Precautions” on page 1-8. The Event Monitoring Unit (EMU) module is hot-swappable and can be replaced with the array powered on.

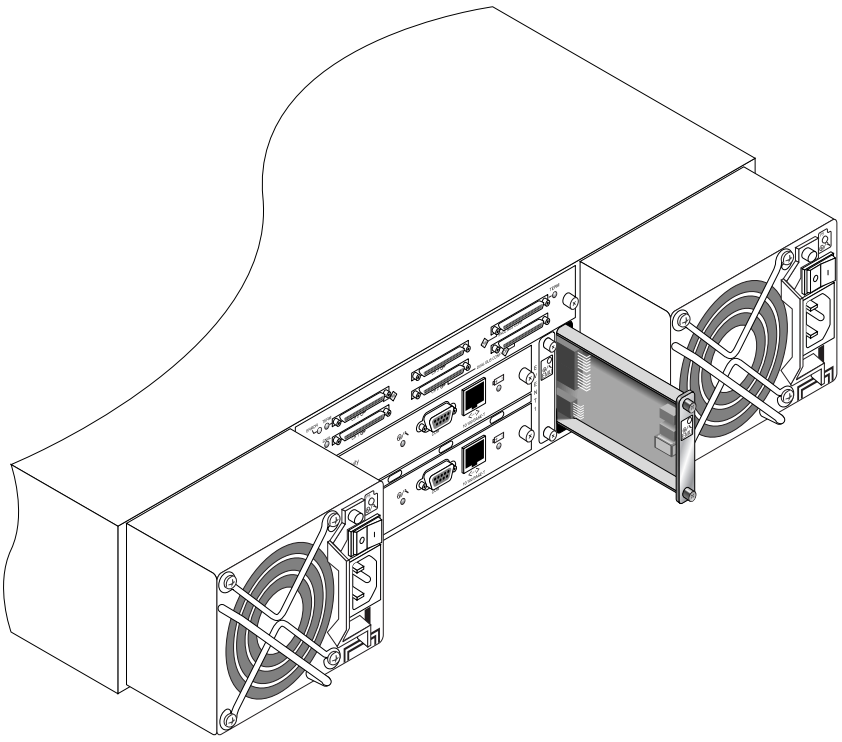


FIGURE 10-2 The EMU Module Partially Pulled out of the Chassis

10.3.1 Removing an EMU Module

1. **With the power on, and turn the thumbscrews on the top and bottom of an EMU module counterclockwise until the thumbscrews are disengaged from the chassis.**
2. **Hold the thumbscrews, and pull out the EMU module.**

10.3.2 Installing an EMU Module

1. **With the power on, slide the new EMU module into the chassis until it is firmly seated in the backplane and the module's front panel is flush with the chassis.**

Caution – Be sure that the EMU module is properly inserted into the guide rails of the array.

2. **Turn the thumbscrews on the top and bottom of the EMU module clockwise until they are finger-tight, to secure the module.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

10.4 Installing a RAID/Expansion Chassis FRU

The Sun StorEdge 3310 SCSI array and the Sun StorEdge 3320 SCSI array box FRU includes a chassis, its drive midplane, and its backplane. This product is ordered to replace a box that has been damaged or whose midplane or backplane has been damaged.

To make a fully functional array, you must add the following parts from the replaced array:

- Drive modules
- Two power supply/fan modules
- Two EMU modules
- One or two JBOD I/O modules (for an expansion unit or JBOD)
- One or two RAID I/O modules (for a RAID array)
- One or two RAID controllers (for a RAID array)
- One terminator module

To install the individual modules, use the replacement instructions provided in this guide.

To configure the array, refer to the installation manual for your array, located on your Sun StorEdge 3000 Family Documentation CD.

To replace the chassis frame of an existing RAID array or expansion unit, perform the following steps.

1. **Connect to the firmware application via the serial interface (`tip` for Solaris/Linux) or via `telnet`.**

Caution – Connected hosts must be inactive during this replacement procedure.

---

2. **If the defective array is a RAID array:**

   From the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters."

   Write down the Controller Unique Identifier (hex) - value.

3. **Power off both power supply modules on the defective array.**
4. **Ensure all SCSI cables attached to the I/O module are labeled clearly.**
5. **Write down the defective array's cabling configuration.**
6. **Remove all SCSI cables attached to the I/O module.**
7. **If the defective array is a RAID array, remove all serial and Ethernet cables connected to the RAID controllers.**
8. **Label each disk drive with its disk slot position in the array.**
9. **Remove the RAID controllers (if applicable), terminator board (if applicable), I/O modules, EMUs, power supply modules, and disk drives from the defective array.**
10. **Remove the defective chassis.**
11. **Obtain the replacement chassis.**
12. **Re-install all previously removed modules in their original positions in the replacement array.**
13. **Reinstall all SCSI, serial, Ethernet, and power cables in their original positions.**
14. **Power on both power supply modules on the replacement array.**
15. **If the replacement array is an expansion unit or JBOD, refer to your installation manual to configure it.**
16. **If the replacement chassis is a RAID array, proceed with the following steps:**

    a. **Connect to the array console menu interface via the serial interface (`tip` for Solaris/Linux) or via `telnet`.**

    b. **From the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters → Controller Unique Identifier (hex)."**

17. **If this array is being used by clustered hosts, or for any other reason its attached hosts require that their Device IDs remaining consistent, perform these steps:**

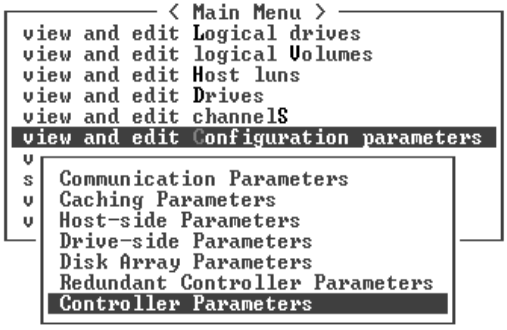
    a. **Set Controller Unique Identifier (hex) to the value you wrote down in Step 2.**

    b. **Reset the RAID Controllers: From the RAID firmware Main Menu, choose "system Functions → Reset controller." Confirm Yes when prompted.**

    c. **Proceed with Step 19.**

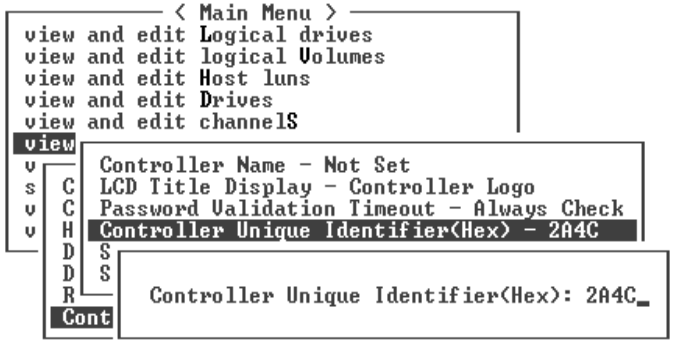
18. **If this array is NOT being used by clustered hosts, perform these steps:**

    a. **On the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters → Controller Unique Identifier <hex>."**



    b. **Type in the value** `0` **(to automatically read the chassis serial number from the midplane).**

    The value 0 is immediately replaced with the hex value of the chassis serial number.


< Main Menu >
view and edit Logical drives
view and edit logical Volumes
view and edit Host luns
view and edit Drives
view and edit channelS
Controller Name - Not Set
LCD Title Display - Controller Logo
Password Validation Timeout - Always Check
Controller Unique Identifier(Hex) - 2A4C
Controller Unique Identifier(Hex): 2A4C

    c. **To implement the revised parameter value, choose "system Functions → Reset Controller." Confirm Yes when prompted.**

19. **Connect the array to hosts according to the configuration identified in Step 4 and Step 5.**

    The chassis replacement is now complete.

10.5 Special JBOD Usage With External Terminators

The external terminator is necessary only during certain maintenance tasks performed with a Sun StorEdge 3310 SCSI JBOD or a Sun StorEdge 3320 SCSI JBOD split-bus configuration, which is connected directly to multiple servers in a clustering environment (most often, the Sun Cluster environment). With many maintenance tasks, you remove a failed or outdated part and replace it immediately; this is standard procedure.

However, if you have an unusual situation and need to remove a host connection from the JBOD for a prolonged period, you might need to preserve the other host connections and activity on the JBOD.

The Sun SCSI LVD/MSE external terminator is part number XTA-3310-SC-TERM (595-6750-01).

10.5.1 External Terminators for Special Split-Bus JBOD Maintenance

If you have JBOD I/O modules, part number 370-5396-02/50 or higher, use this information.

Note – This new I/O module supports both single-initiator and multi-initiator split-bus configurations. The older I/O module supports only single-initiator split-bus configurations.

If you have earlier I/O modules and do not have JBOD I/O modules, part number 370-5396-02/50 or higher, see Section 10.5.2, “Older JBOD Split-Bus Configurations” on page 10-12.

To preserve all original SCSI IDs and correct termination on a split-bus JBOD in a cluster environment, insert an external terminator in all cases where a SCSI port becomes empty that was not empty in the original configuration. This maintains the SCSI drive IDs for the active host connections. For an example of two removed cables and two inserted terminators, see FIGURE 10-3.

In a split-bus configuration, the SCSI IDs change according to the termination on the SCSI ports. If your original configuration has both SCSI ports connected on a bus connected to hosts, the SCSI IDs are 0 to 5. If only the bottom port is connected to a host, the SCSI drive IDs are 8 to 13.

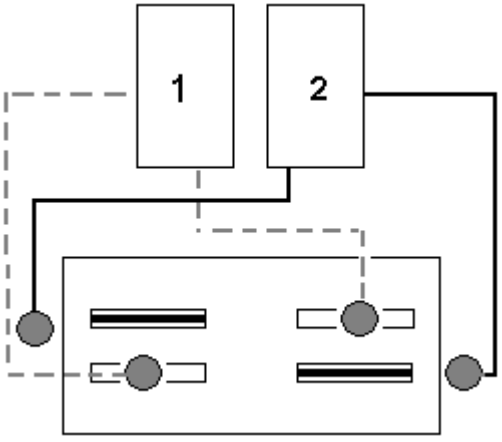


FIGURE 10-3 Two Terminators for Two Cables That Have Been Removed in a Split-Bus Configuration

Caution – SCSI IDs are based on the cabling of the array when the array is powered up. If you are removing host connections from a dual-host split-bus multi-initiator configuration, use terminators to preserve the existing SCSI ID assignments (as well as the termination on the bottom SCSI ports).

To keep other host connections operational while one host connection is temporarily removed, perform the following steps.

1. **Stop all host I/O activity on the host bus where the removal of a cable will occur.**
2. **Disconnect the array from the host SCSI cable of the server that requires the maintenance work from the array.**
3. **Insert the external terminator into the empty SCSI port on the array.**

   The external terminator preserves the original SCSI IDs.
4. **Resume host I/O activity on the remaining hosts.**

10.5.2 Older JBOD Split-Bus Configurations

If you have earlier I/O modules and do not have JBOD I/O modules part number 370-5396-02/50 or higher, use the information in this section.

Note – The older I/O modules only supported single-initiator split-bus configurations.

In a split-bus configuration, the SCSI IDs change according to the termination on the SCSI ports. If your original configuration has both SCSI ports connected on a bus connected to hosts, the SCSI IDs are 0 to 5. If only the bottom port is connected to a host, the SCSI IDs are 8 to 15. To preserve all original SCSI IDs and correct termination on a split-bus JBOD in a cluster environment, insert an external terminator in all cases where a top SCSI port is empty but was not empty in the original configuration.

Note – As a general rule, external terminators are necessary in JBOD configurations (for JBOD configuration information, refer to the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array). The two bottom SCSI ports on the JBOD are typically terminated with a host bust adapter (HBA) host connection or a SCSI jumper cable. The upper I/O SCSI connectors are autoterminated. Single-bus JBOD cabling does not require an external terminator at any time; only the split-bus JBOD cabling in the cluster environment has a condition where external terminators are required.

Caution – In a cluster configuration, adding a separate host connection that was not originally planned for the array will cause a change in SCSI IDs and therefore loses access to data stored under the original SCSI IDs.

To keep other host connections operational while one host connection is temporarily removed, perform the following steps.

1. **Stop all host I/O activity on the host bus where the removal of a cable will occur.**
2. **Disconnect the array from the host SCSI cable of the server that requires the maintenance work from the array.**
3. **In a split-bus configuration, if two hosts are connected to one bus, and the host cable to the bottom port of the array is disconnected, move the cable of the top port to the bottom port.**

   The moved cable provides termination to the bottom port.

4. **Insert the external terminator into the empty top SCSI port on the array.**

   The external terminator preserves the original SCSI IDs, which are 0 to 5 on each bus that has two host connections established.

5. **Resume host I/O activity on the remaining hosts.**

   You can have situations in which one or two SCSI cables are temporarily removed from a standard SCSI array configuration.

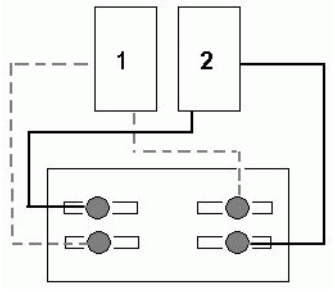


FIGURE 10-4 Example of a SCSI Array Configuration

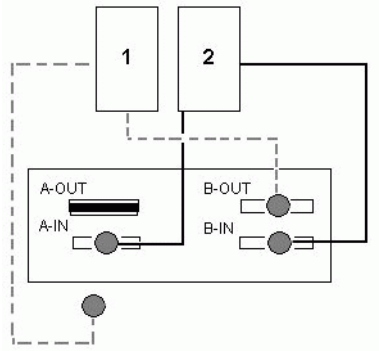
In each of the four scenarios in FIGURE 10-5 and FIGURE 10-6, a single cable was removed from the original configuration shown in FIGURE 10-4. In each of these scenarios, one external terminator was required.

Note – The bottom input ports support only host SCSI connections and do not support external terminators.

Scenario #1

Disconnect 1 cable from A-IN port:

1. Disconnect Host 1 cable from port A-IN.
2. Unplug cable from port A-OUT and move it to port A-IN.
3. Install a terminator in port A-OUT.



Scenario #2

Disconnect 1 cable from B-IN port:

1. Disconnect Host 1 cable from port B-IN.
2. Unplug cable from port B-OUT and move it to port B-IN.
3. Install a terminator in port B-OUT.

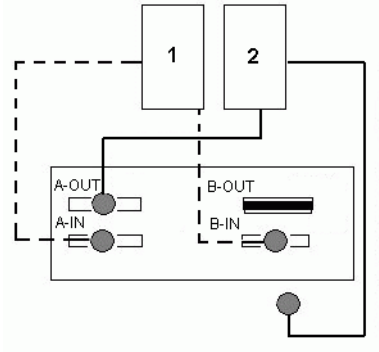
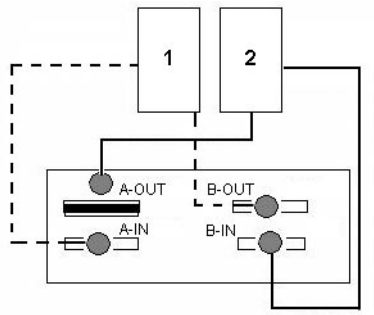


FIGURE 10-5 Removing a Single Cable From an IN Port in a Two-Host Configuration

Scenario #3

Disconnect 1 cable from A-OUT port:

1. Disconnect Host 1 cable from port A-OUT.
2. Install a terminator in port A-OUT.



Scenario #4

Disconnect 1 cable from B-OUT port:

1. Disconnect Host 1 cable from port B-OUT.
2. Install a terminator in port B-OUT.

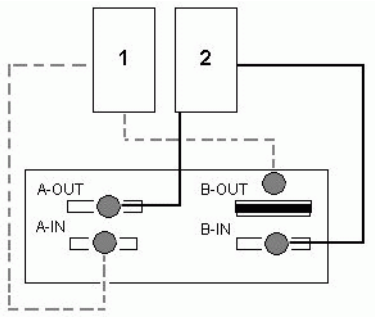


FIGURE 10-6 Removing a Single Cable From an OUT Port in a Two-Host Configuration

10.6 Installing a Filler Panel on a SCSI Array

The filler panel FRU is a single metal panel used to cover an empty controller module slot on the rear of a Sun StorEdge 3310 SCSI array or a Sun StorEdge 3320 SCSI array. Most often, this occurs when you want to remove a controller module and change a dual-controller array to a single-controller array. The filler panel protects the interior of the array.

To install a filler panel, perform the following steps.

1. **Remove the controller module according to Section 7.3.1, "Removing a SCSI Controller Module" on page 7-5.**
2. **Position the filler panel so that it covers the empty slot and the thumbscrews overlay the thumbscrew holes.**
3. **Turn the thumbscrews on the left and right sides of the filler panel clockwise until the thumbscrews are finger-tight, to secure the panel on the array.**

CHAPTER 11

Sun StorEdge 3120 SCSI Array FRUs

This chapter provides instructions for removing and installing field-replaceable units (FRUs) which are specific to the Sun StorEdge 3120 SCSI array. FRU components can be replaced by customers or by Sun service representatives.

At this time, there is only one FRU procedure which is unique to the Sun StorEdge 3120 SCSI array.

11.1 Installing an Expansion Chassis FRU

The Sun StorEdge 3120 SCSI array box FRU includes a chassis, its drive midplane, and its backplane. This product is ordered to replace a box that has been damaged or whose midplane, backplane, or terminator module has been damaged.

To make a fully functional array, you must add the following parts from the replaced array:

- Drive modules
- Two power supply/fan modules

To install the individual modules, use the replacement instructions provided in this guide.

To configure the array, refer to the installation manual for your array, located on the Sun StorEdge 3000 Family Documentation CD and on the Sun website.

To replace the chassis frame of an existing JBOD, perform the following steps.

Caution – Connected hosts must be inactive during this replacement procedure.

Note – Be sure to follow Section 1.2, "Static Electricity Precautions" on page 1-8 for all procedures.

1. **Power off both power supply modules on the defective array.**
2. **Ensure all SCSI cables attached to the I/O module are labeled clearly.**
3. **Write down the defective array's cabling configuration.**
4. **Write down the SCSI ID switch setting, right or left.**

   The IDs assigned for disks 1 through 4 depend on the switch settings on the array. The right switch setting uses IDs 8, 9, 10, and 11. The left switch setting uses IDs 12, 13, 14, and 15.
5. **Remove all SCSI cables attached to the I/O module.**
6. **Label each disk drive with its disk slot position in the array.**
7. **Remove the power supply modules and disk drives from the defective array.**
8. **Remove the defective chassis.**
9. **Obtain the replacement chassis.**
10. **Re-install all previously removed modules in their original positions into the replacement array.**
11. **Re-install all SCSI and power cables in their original positions.**
12. **Set the SCSI ID switch to right or left depending on your previous configuration.**

Note – SCSI IDs are set based on the switch setting on the array when it is powered on. If you change the switch setting, the SCSI IDs will change after you power off, and then power on.

13. **Power on both power supply modules.**
14. **Refer to your installation manual to configure the JBOD.**

APPENDIX **A**

Inserting a 3.2x Controller Into a 4.1x Chassis

When you replace a controller in a dual-controller configuration with a new controller with compatible firmware, the firmware of the remaining functional controller automatically overwrites the firmware of the new replacement controller to maintain compatibility. This is referred to as *cross-loading*.

Cross-loading works in the following situations:

- Replacing a 4.1x controller with another 4.1x controller
- Replacing a 4.1x controller with a 3.66 controller (Sun StorEdge 3310 SCSI controller FRUs only)
- Replacing a 3.25 controller with a 3.66 controller (Sun StorEdge 3310 SCSI controller FRUs only)
- Replacing a 3.2x controller with another 3.2x controller
- Replacing a 3.2x controller with a 4.1x controller

Cross-loading does not work when you replace a 4.1x controller with a 3.2x controller. If you replace a 4.1x controller with a 3.2x controller in a dual configuration without upgrading the 3.2x controller, the replacement controller will not be recognized.

The following procedures show how to perform a controller replacement with a 3.2x controller in a dual-controller configuration. For all other controller replacement procedures, see Chapter 6, Chapter 7, and Chapter 8 in this guide.

A.1 Replacing a 4.1x Controller with a 3.27 Controller (FC and SATA Only)

Note – This procedure only applies if you are replacing a 4.1x I/O controller with a 3.27 I/O controller in a dual-controller FC or SATA configuration. For all other FC and SATA controller replacement procedures, see Chapter 6 in this guide.

The 3.27 controller FRU part numbers are:

- 370-5537-06 (X-Option 595-6578-05) for the Sun StorEdge 3510 FC array
- 370-6773-01 (X-Option 595-7419-01) for the Sun StorEdge 3511 SATA array

If you have a 4.1x dual-controller configuration where one controller fails and you have a 3.27 replacement controller module FRU, perform the following steps.

1. **Keep the array powered on and make sure that the connected hosts are inactive.**
2. **Save the NVRAM configuration settings to disk.**
   a. **From the RAID firmware Main Menu, choose "system Functions → controller maintenance → Save nvram to disks."**
   b. **Choose Yes to confirm.**
      A message informs you that NVRAM information has been successfully saved.
3. **Power off the array.**
4. **Write down the cabling configuration for the controller-to-host connections for both controllers.**
5. **Remove all cables and SFPs from the failed controller module.**
   For clarity, the failed 4.1x controller module will be referred to as *controller module A* for the remainder of this procedure. The working 4.1x controller module will be referred to as *controller module B*.
6. **Turn the thumbscrews on the left and right sides of controller module A counterclockwise until the thumbscrews are disengaged from the chassis.**
7. **Grasp the handle and carefully pull out controller module A.**
   Set aside controller module A.
8. **Remove all cables from controller module B.**
9. **Turn the thumbscrews on the left and right sides of controller module B counterclockwise until the thumbscrews are disengaged from the chassis.**

10. **Grasp the handle and carefully pull out controller module B.**

Note – Use care not to confuse the failed controller module A with the working controller module B.

---

11. **Insert the 3.27 replacement controller.**

    a. **Gently slide the controller module into the unit.**

Caution – Be sure that the module is properly inserted into the guide rails of the array.

---

    b. **Insert the controller FRU into the slot, and push forward until you begin to feel resistance as the connecting pins engage.**

    c. **Push the controller FRU until the connecting pins are fully seated and the RAID controller fits flush against the back plate of the RAID array.**

    Failure to insert the controller carefully as described above can cause one of the following problems:

    - The surviving controller might reset, causing the storage to go offline since neither controller is operational. **Recovery:** Wait until both RAID controllers initialize and come up in redundant mode with no intervention required.
    - The replacement controller might become primary and the surviving controller might become secondary. This causes storage to go offline. **Recovery:** Wait while both RAID controllers initialize and come up in redundant mode with no intervention required.
    - If the controller status LED is blinking green on both controllers, then both controllers are primary controllers. **Recovery:** Take out the replacement controller and reinsert it, carefully following the instructions above. If this does not remedy the problem, power-cycle the array.

12. **Turn the thumbscrews on the left and right sides of the new 3.27 controller module clockwise until they are finger-tight, to secure the module and to make the module's front panel flush with the chassis.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

---

13. **Power on the array.**

14. **Upgrade the firmware on the replacement controller to version 4.1x.**

    Refer to the patch README file for your array for specific instructions on loading firmware onto your new controller.

15. **Reconnect the original cables to the new I/O controller module.**

Caution – You must connect the hosts to the correct host channels on the I/O controller module, or your configuration will not work correctly.

16. **Check the "Controller Unique Identifier" parameter to ensure that it is set to the correct value.**

    From the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters → Controller Unique Identifier <hex>."

17. **If the "Controller Unique Identifier" is not set, type the value 0 (to automatically read the chassis serial number from the midplane) or type the hex value for the original serial number of the chassis (used when the midplane has been replaced).**

    The Controller Unique Identifier is used to create Ethernet MAC addresses and worldwide names. The value 0 is immediately replaced with the hex value of the chassis serial number. A nonzero value should be specified only if the chassis has been replaced, but the original chassis serial number must be retained; this feature is especially important in a Sun Cluster environment to maintain the same disk device names in a cluster.

18. **Insert controller module B into the unit.**

    a. **Keep the array powered on and gently slide the controller module into the unit.**

Caution – Be sure that the module is properly inserted into the guide rails of the array.

    b. **Insert the controller FRU into the slot, and push forward until you begin to feel resistance as the connecting pins engage.**

    c. **Push the controller FRU until the connecting pins are fully seated and the RAID controller fits flush against the back plate of the RAID array.**

    Failure to insert the controller carefully as described above can cause one of the following problems:

    - The surviving controller might reset, causing the storage to go offline since neither controller is operational. **Recovery:** Wait until both RAID controllers initialize and come up in redundant mode with no intervention required.
    - The replacement controller might become primary and the surviving controller might become secondary. This causes storage to go offline. **Recovery:** Wait while both RAID controllers initialize and come up in redundant mode with no intervention required.

- If the controller status LED is blinking green on both controllers, then both controllers are primary controllers. **Recovery:** Take out the replacement controller and reinsert it, carefully following the instructions above. If this does not remedy the problem, power-cycle the array.

19. **Turn the thumbscrews on the left and right sides of controller module B clockwise until they are finger-tight.**

20. **Reconnect the original cables to controller module B.**

    Controller module B automatically becomes the secondary controller.

Caution – Wait a minimum of 10 minutes for the firmware cross-load to be completed. If controller module B is removed for *any* reason during the period when the status LED is amber (for 10 minutes or more), the controller can be rendered inoperable and must be returned for repair.

To monitor this process, see Section 6.3.3, "Monitoring the Automatic Firmware Update with a Recently Installed Controller FRU" on page 6-9.

If after the firmware cross-load you hear an audible alarm and see a blinking amber Event light on the front of your array, the SCSI Enclosure Services (SES) firmware or its associated Programmable Logic Device (PLD) code in the new controller has a version that is different from the code in the other I/O controller in your array. To solve this mismatch, see Section 6.3.4, "SES Firmware Update Sometimes Required with I/O Controller Module Replacements" on page 6-10.

Note – The beep code that identifies an SES or PLD firmware mismatch is the repeating Morse code letter "R" (dot dash dot).

---

21. **Check that the secondary controller is active on the array by entering one of the following commands:**

    - From the RAID firmware Main Menu, choose "view and edit Peripheral devices → View Peripheral Device Status."

      The "Redundant Controller: Enabled" status indicates an initialized secondary redundant controller.

    - Enter the following CLI command.

```
sccli> show redundancy-mode
```

      The "Redundancy Status: Enabled" indicates an initialized secondary redundant controller.

A.2 Replacing a 4.1x Controller with a 3.25 Controller (Sun StorEdge 3310 SCSI Controller FRUs Only)

Note – This procedure only applies if you are replacing a 4.1x SCSI controller with a 3.25 SCSI controller in a dual-controller SCSI configuration. For all other SCSI controller replacement procedures, see Chapter 7 and Chapter 8 in this guide.

The 3.25 SCSI controller FRU part numbers are:

- 370-5403-03 (X-Option 595-6572-03) for the 3.25 controller firmware model
- 370-5403-04 (X-Option 595-6572-04) for the 3.66 controller firmware model

If you have a 4.1x dual-controller configuration where one controller fails and you have a 3.25 replacement controller module FRU, perform the following steps.

1. **Keep the array powered on.**
2. **Save the NVRAM configuration settings to disk.**

   a. **From the RAID firmware Main Menu, choose "system Functions → controller maintenance → Save nvram to disks."**

   b. **Choose Yes to confirm.**

      A message informs you that NVRAM information has been successfully saved.

3. **Power off the array.**

   For clarity, the failed 4.1x controller module will be referred to as controller module A for the remainder of this procedure. The working 4.1x controller module will be referred to as controller module B.

4. **Turn the thumbscrews on the left and right sides of controller module A counterclockwise until the thumbscrews are disengaged from the chassis.**

5. **Grasp the handle and carefully pull out controller module A.**

   Set aside controller module A.

6. **Turn the thumbscrews on the left and right sides of controller module B counterclockwise until the thumbscrews are disengaged from the chassis.**

7. **Grasp the handle and carefully pull out controller module B.**

Note – Use care not to confuse the failed controller module A with the working controller module B.

---

8. **Insert the 3.25 replacement controller.**

   a. **Gently slide the controller module into the unit.**

Caution – Be sure that the module is properly inserted into the guide rails of the array.

---

   b. **Insert the controller FRU into the slot, and push forward until you begin to feel resistance as the connecting pins engage.**

   c. **Push the controller FRU until the connecting pins are fully seated and the RAID controller fits flush against the back plate of the RAID array.**

Failure to insert the controller carefully as described above can cause one of the following problems:

- The surviving controller might reset, causing the storage to go offline since neither controller is operational. **Recovery:** Wait until both RAID controllers initialize and come up in redundant mode with no intervention required.
- The replacement controller might become primary and the surviving controller might become secondary. This causes storage to go offline. **Recovery:** Wait while both RAID controllers initialize and come up in redundant mode with no intervention required.
- If the controller status LED is blinking green on both controllers, then both controllers are primary controllers. **Recovery:** Take out the replacement controller and reinsert it, carefully following the instructions above. If this does not remedy the problem, power-cycle the array.

9. **Turn the thumbscrews on the left and right sides of the new 3.25 controller module clockwise until they are finger-tight, to secure the module and to make the module's front panel flush with the chassis.**

Note – To ensure that a thumbscrew is finger-tight, tighten it with a screwdriver and then loosen the thumbscrew counterclockwise a quarter turn.

---

10. **Power on the array.**

11. **Upgrade the firmware on the replacement controller to version 4.1x.**

    Refer to the patch README for your array for specific instructions on loading firmware onto your new controller.

Caution – You must connect the hosts to the correct host channels on the SCSI controller module, or your configuration will not work correctly.

---

12. **Check the "Controller Unique Identifier" parameter to ensure that it is set to the correct value.**

    From the RAID firmware Main Menu, choose "view and edit Configuration parameters → Controller Parameters → Controller Unique Identifier <hex>."

13. **If the "Controller Unique Identifier" is not set, type the value 0 (to automatically read the chassis serial number from the midplane) or type the hex value for the original serial number of the chassis (used when the midplane has been replaced).**

    The Controller Unique Identifier is used to create Ethernet MAC addresses and worldwide names. The value 0 is immediately replaced with the hex value of the chassis serial number. A nonzero value should be specified only if the chassis has been replaced, but the original chassis serial number must be retained; this feature is especially important in a Sun Cluster environment to maintain the same disk device names in a cluster.

14. **Insert controller module B into the unit.**

    a. **Keep the array powered on and gently slide the controller module into the unit.**

Caution – Be sure that the module is properly inserted into the guide rails of the array.

---

    b. **Insert the controller FRU into the slot, and push forward until you begin to feel resistance as the connecting pins engage.**

c. Push the controller FRU until the connecting pins are fully seated and the RAID controller fits flush against the back plate of the RAID array.

Failure to insert the controller carefully as described above can cause one of the following problems:

- The surviving controller might reset, causing the storage to go offline since neither controller is operational. **Recovery:** Wait until both RAID controllers initialize and come up in redundant mode with no intervention required.
- The replacement controller might become primary and the surviving controller might become secondary. This causes storage to go offline. **Recovery:** Wait while both RAID controllers initialize and come up in redundant mode with no intervention required.
- If the controller status LED is blinking green on both controllers, then both controllers are primary controllers. **Recovery:** Take out the replacement controller and reinsert it, carefully following the instructions above. If this does not remedy the problem, power-cycle the array.

15. Turn the thumbscrews on the left and right sides of controller module B clockwise until they are finger-tight.

Controller module B automatically becomes the secondary controller.

Caution – Wait a minimum of 10 minutes for the firmware cross-load to be completed. If controller module B is removed for *any* reason during the period when the status LED is amber (for 10 minutes or more), the controller can be rendered inoperable and must be returned for repair.

To monitor this process, see Section 8.3.3, "Monitoring the Automatic Firmware Update for a Recently Installed Controller FRU" on page 8-8.

16. Check that the secondary controller is active on the array by entering one of the following commands:

- From the RAID firmware Main Menu, choose "view and edit Peripheral devices → View Peripheral Device Status."

  The "Redundant Controller: Enabled" status indicates an initialized secondary redundant controller.

- Enter the following CLI command.

```
sccli> show redundancy-mode
```

The "Redundancy Status: Enabled" indicates an initialized secondary redundant controller.

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